



# Displaywriter System

## Product Support Manual

S241-6249-0

“Selectric” Element Printer

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## SAFETY PRECAUTIONS

*All IBM Customer Engineers are expected to take every safety precaution possible and observe the following safety practices when servicing IBM equipment.*

### *Mechanical Safety:*

1. Safety glasses must be worn.
2. All safety devices, such as guards, shields, signs, ground wires, etc., must be restored after maintenance. When a guard or shield is removed to observe or make an adjustment, that shield must be replaced when work in the area is completed.
3. Watches, rings, necklaces, ID bracelets, etc., must be removed when servicing the machine.
4. Care must be used when working near moving parts. Keep hair away from moving parts. Avoid wearing loose clothing that might be caught in the machine. Shirt sleeves must be kept buttoned or rolled above the elbows. Ties must be tucked in the shirt or have a tie clasp approximately three inches from the end. Tie chains are not recommended.

### *Electrical Safety:*

1. The equipment referenced in this manual may use high voltages. Check voltage labels!
2. Safety glasses must be worn when checking energized circuits.
3. If a circuit is disconnected for servicing or parts replacement, it must be reconnected and tested before allowing the use of the machine.
4. Power should be removed from the machine for servicing whenever possible. Remember, when checking voltages, avoid contacting ground potential, such as metal floor strips, machine frame, etc.
5. Meter continuity checks should be used instead of voltage checks whenever possible.
6. Do not apply power to any part, component, or subassembly when it is not physically mounted in the machine.

### *General Safety:*

1. Each Customer Engineer is responsible to be certain no action on his/her part makes the product unsafe or exposes customer personnel to hazards.
2. Store the removed machine covers in a safe, out of the way place where no one can trip over them.
3. If you must leave the machine in a down condition, always install the covers and disconnect the power before leaving the customer's office.
4. Always place CE tool kit away from walk areas where no one can trip over it.
5. Maintain safe conditions in the area of the machine while performing and after completing maintenance.
6. Before starting the equipment, make sure fellow CEs and customer personnel are not in a hazardous position.
7. All the machine covers must be in place before the machine is returned to the customer.

*Note: Refer to the Safety CEMs relating to this product(s) for further safety precautions.*

## INTRODUCTION

This manual is written for both U.S. and World Trade usage. It contains sections for adjustments and diagnostics.

## ADJUSTMENT SECTION

### Purpose

This section provides experienced service personnel a reference for the most commonly used adjustments. Refer to other product publications if additional information is needed.

### Adjustment Identification

The headline of each page shows the name of the mechanism covered on that page. Each adjustment is indicated by a black frame number on the top left corner, followed by the adjustment name. The machine mode, view of the drawing and safety precautions are also noted when required.

### Adjustment Sequence

The frame numbers indicate the sequence of adjustments. One adjustment could affect a following adjustment. Therefore, check all the following adjustments in that mechanism.

Red numbers on the bottom left corner of the frame indicate adjustments out of sequence that could be affected and should be checked.

### Adjustment Procedure

The part to be adjusted is colored red and a red arrow shows the direction of movement. Tolerances and/or additional information on how to perform the adjustment are shown when required.

Always use the adjustment tolerance shown in the publication with the latest date.

## DIAGNOSTICS SECTION

**Functional Checks** — Provide a reliable procedure to test the different mechanisms for failure.

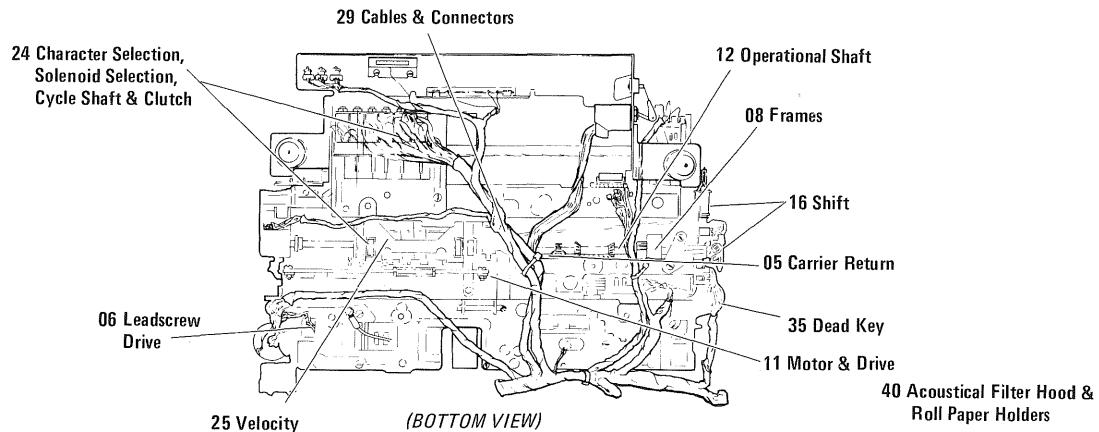
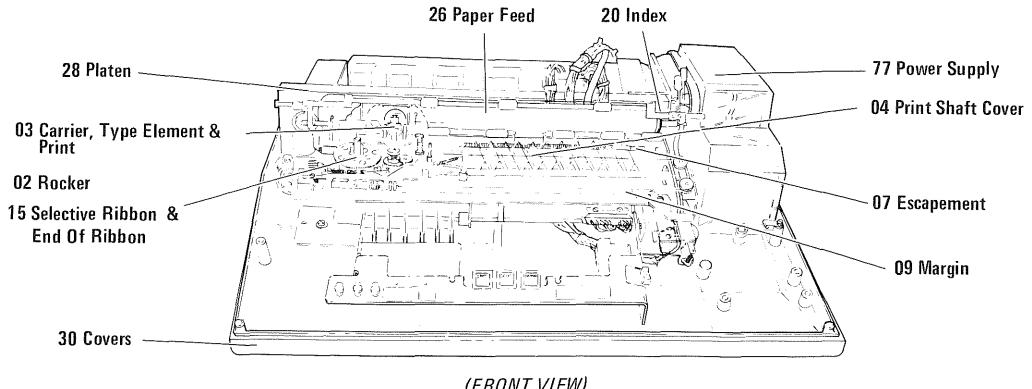
**Flow Charts** — Provide a block logic procedure of finding problem areas.

**Printer Tests** — Provide procedures to exercise the printer.

**Wiring Diagrams** — Provide point-to-point wiring and resistance readings for trouble-shooting.

Refer to other product publications when additional diagnostics are needed.

Mechanism Locator



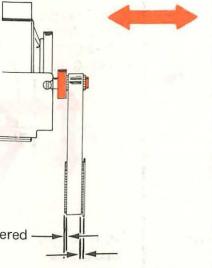
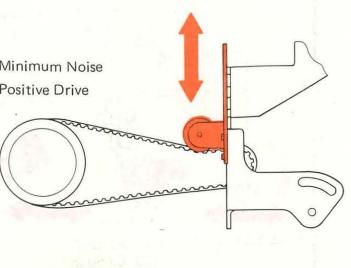
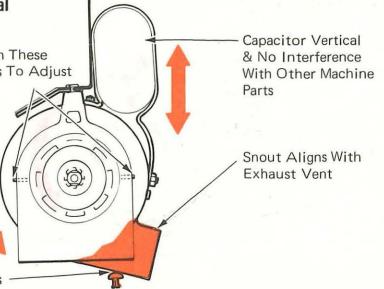
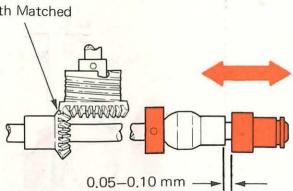
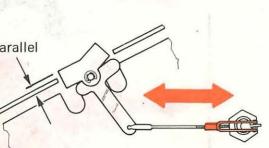
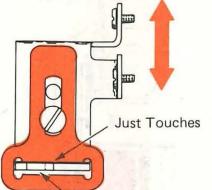
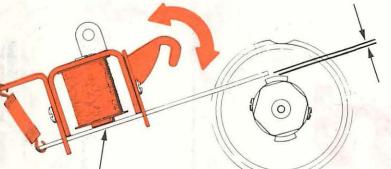
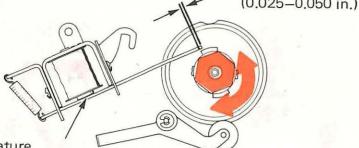
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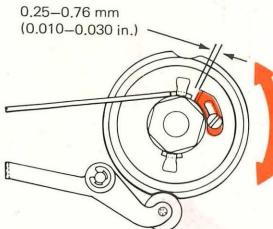
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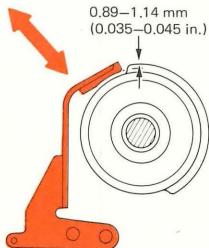
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| <b>8 Shift Magnet Upstop</b><br> <p>Just Touches</p> <p>Armature Operated By Hand</p> | <b>9 Shift Magnet Bracket</b><br> <p>0.13-0.38 mm (0.005-0.015 in.)</p> <p>Armature Operated By Hand</p> <p>Note: No Lubrication On Sleeve. Check Clearance In Both Upper And Lower Case.</p> | <b>10 Shift Clutch Sleeve</b><br> <p>0.64-1.27 mm (0.025-0.050 in.)</p> <p>Armature Operated By Hand</p> |

## -2- Shift, Character Selection

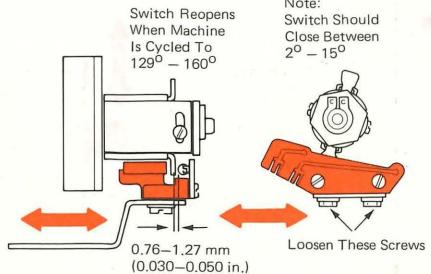
### 11 Shift Overthrow Stop



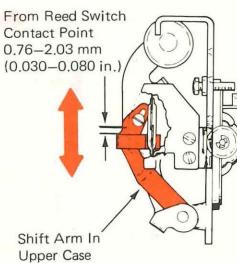
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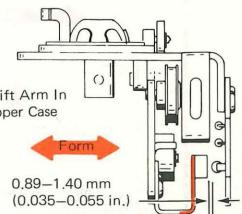
### 13 Shift Feedback



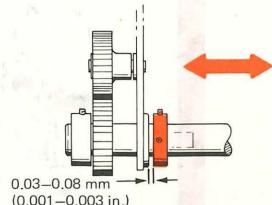
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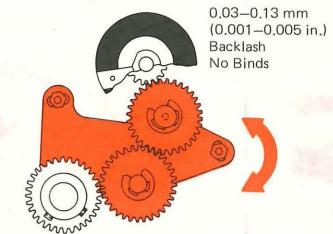
### 15 Shift Mode



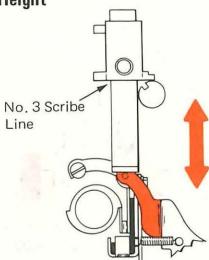
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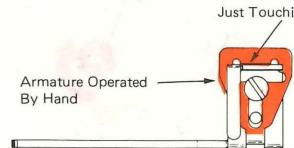
### 17 Idler Gears



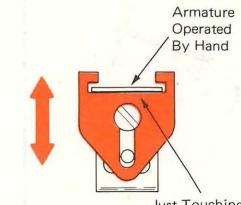
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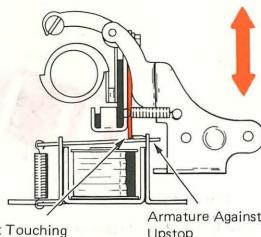
### 19 Cycle Clutch Armature Pivot Plate



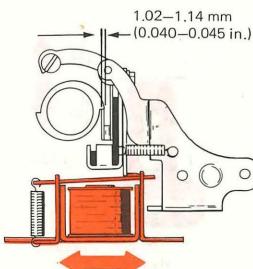
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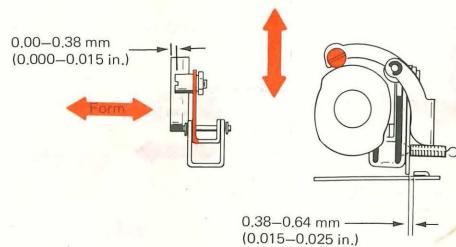
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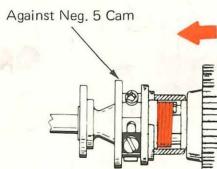
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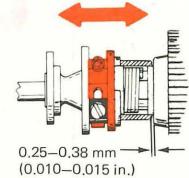
23 Cycle Clutch Restoring Roller



24 Cycle Clutch Spring Lateral



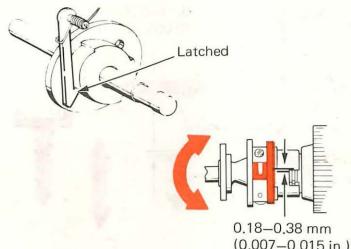
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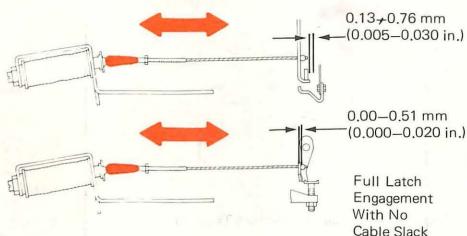
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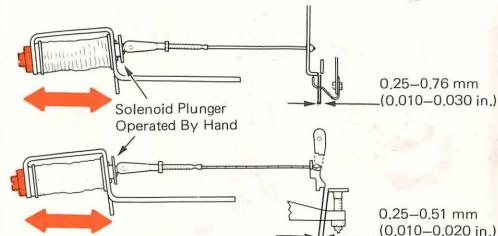
27 Cycle Clutch Overthrow Stop



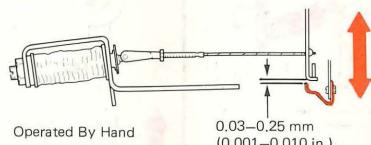
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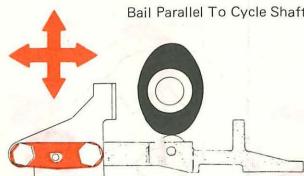
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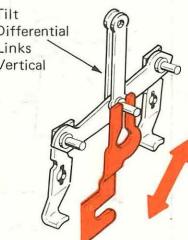


31 Latch Bail Shaft

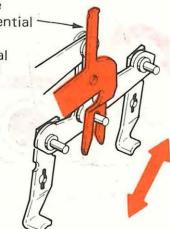


Note: Rollers Should Not Clear The Cycle Shaft Cams By More Than 0.05 mm (0.002 in.)

32 Tilt Differential Guide

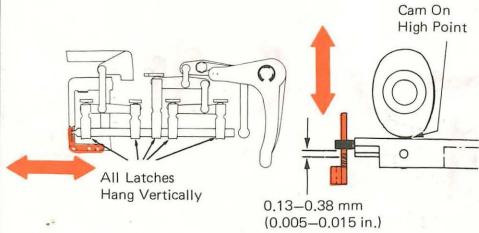


33 Rotate Differential Guide

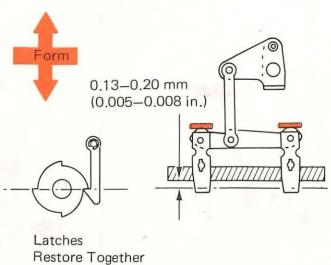


#### 4- Character Selection

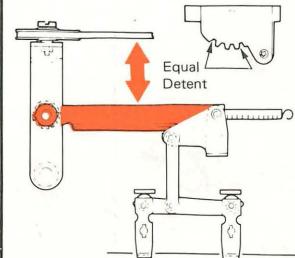
##### 34 Latch Bail Guide



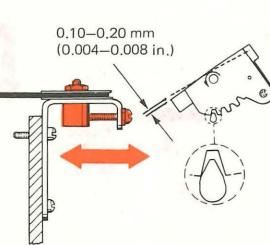
##### 35 Tilt Latches



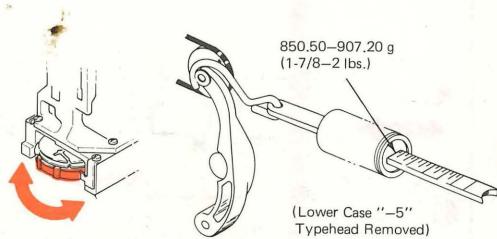
##### 36 Tilt Arm Motion



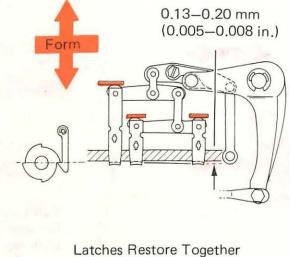
##### 37 Tilt Ring Homing



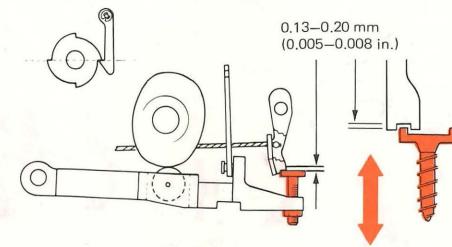
##### 38 Rotate Spring



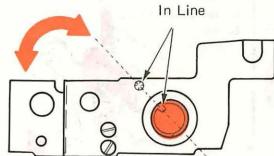
##### 39 Rotate Latches



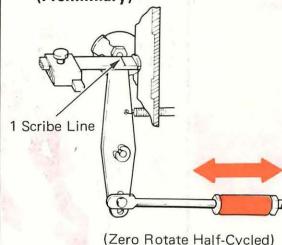
##### 40 Five-Unit Latch



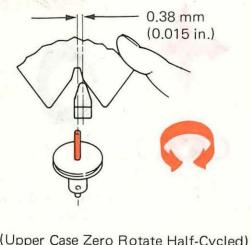
##### 41 Print Shaft Timing (Preliminary)



##### 42 Rotate Arm Vertical (Preliminary)



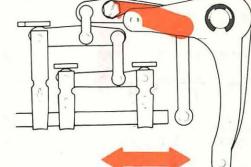
##### 43 Coarse Homing



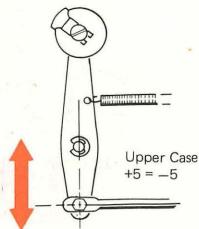
##### 44 Balance Lever

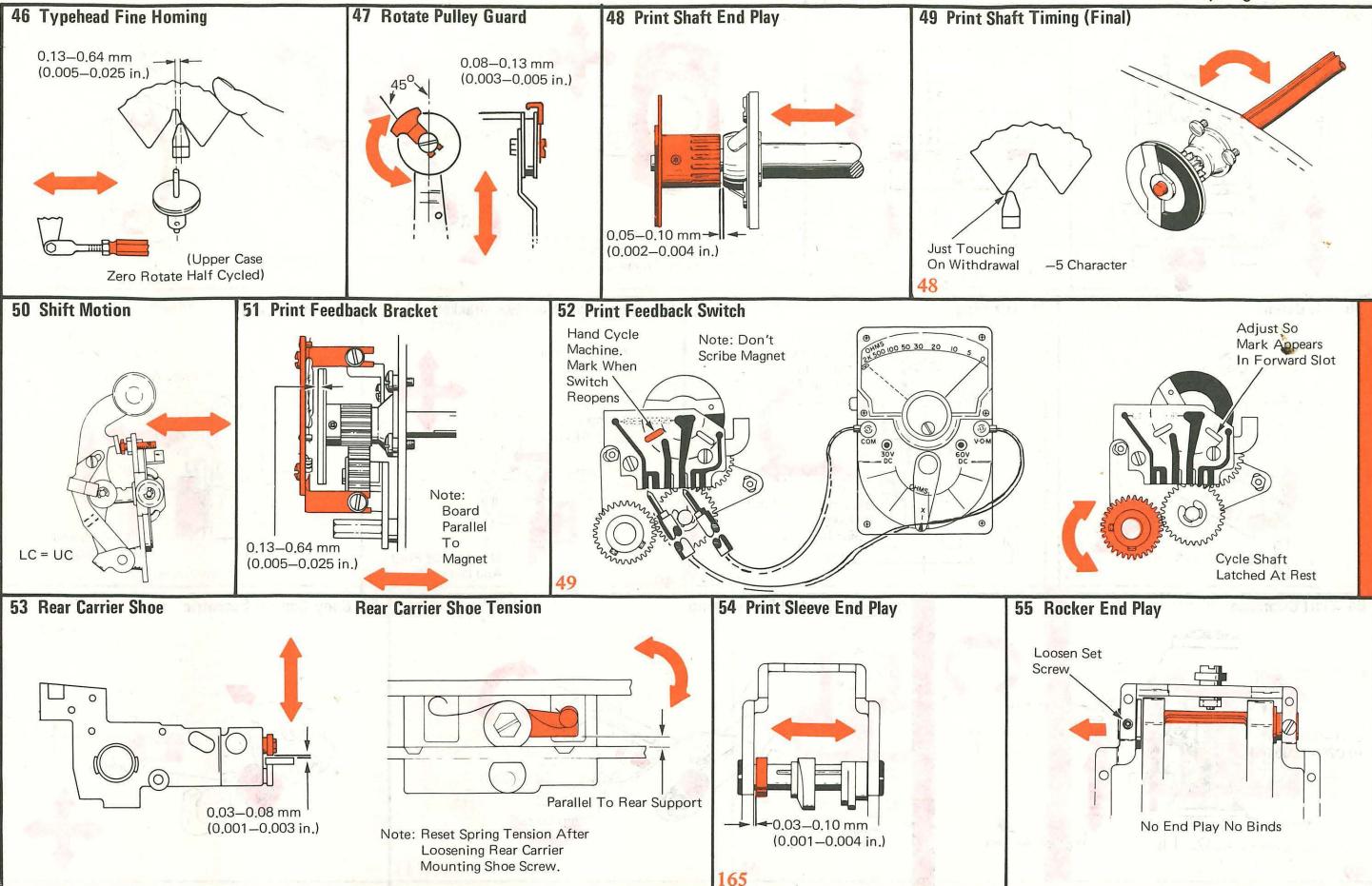
Upper Case  
Rotate O Detent = Neg. 1 Detent

Negative      Positive



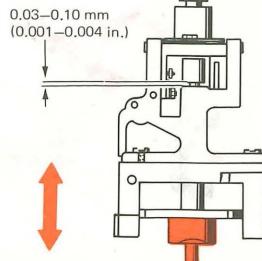
##### 45 Rotate Arm Motion



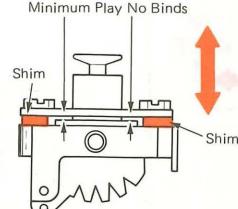


## -6- Alignment, Print

### 56 Rotate Shaft End Play



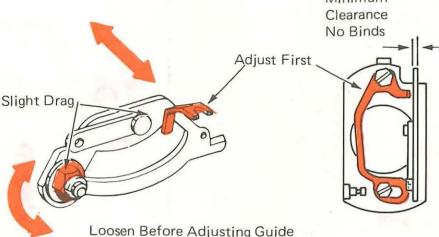
### 57 Upper Ball Socket



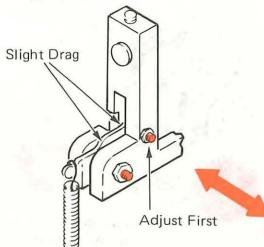
### 58 Tilt Ring Spacer



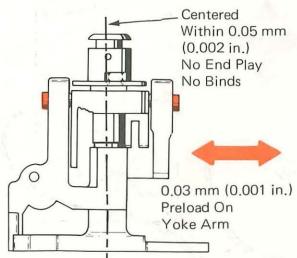
### 59 Rotate Detent



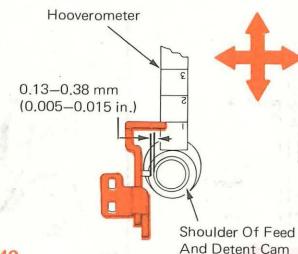
### 60 Tilt Detent



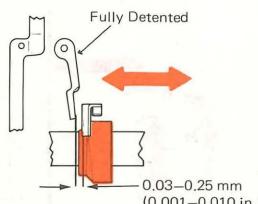
### 61 Tilt Ring



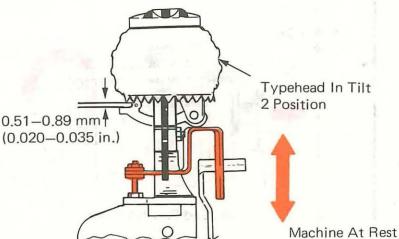
### 62 Detent Cam Follower Bracket



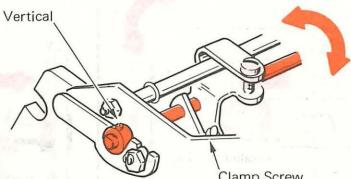
### 63 Detent Cam



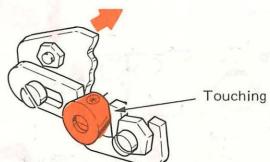
### 64 Skirt Clearance



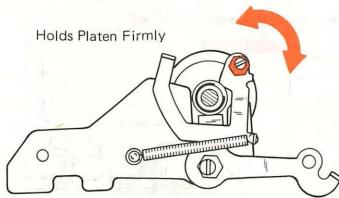
### 65 Copy Control Shaft Clamp



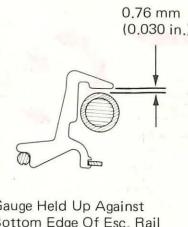
### 66 Copy Control Eccentric



67 Platen Latches



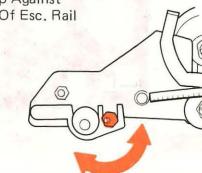
68 Platen Height Preliminary



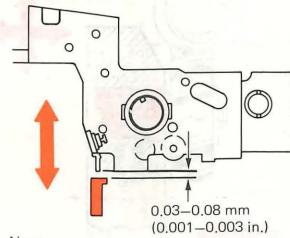
69 Platen Front-To-Rear



68,125

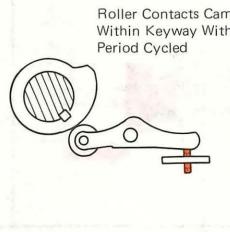


70 Front Carrier Support

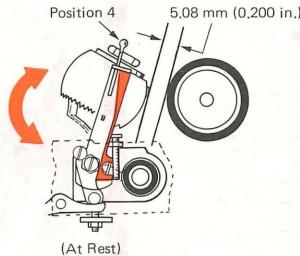


Note:  
Check With Carrier At Both Ends

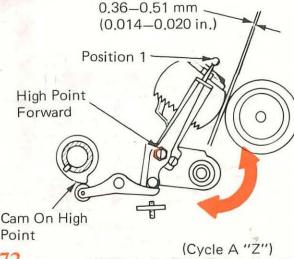
71 Print Cam Follower Stop Screw



72 Powered Flight

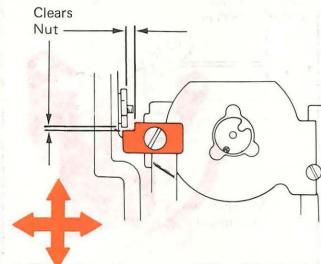


73 Free Flight



72

74 Rocker Upstop

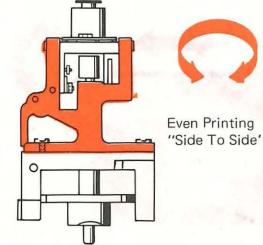


75 Platen Height Final



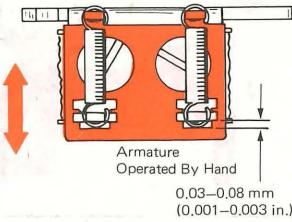
117,125

76 Yoke Position



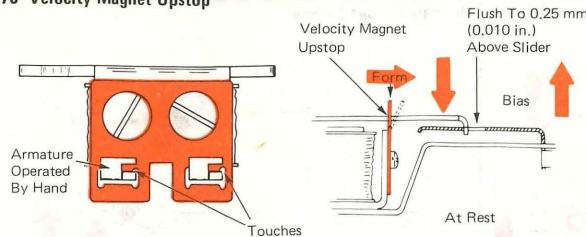
46

77 Velocity Magnet Pivot Plate

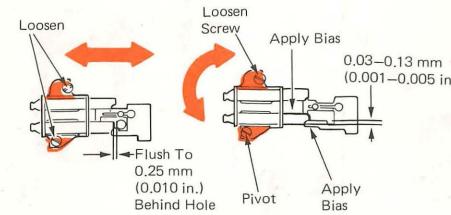


## 8- Velocity, Escapement

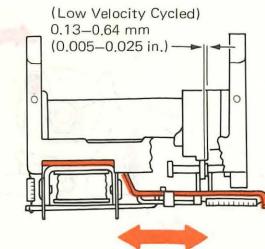
### 78 Velocity Magnet Upstop



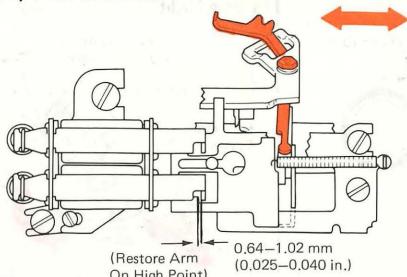
### 79 Magnet Pack



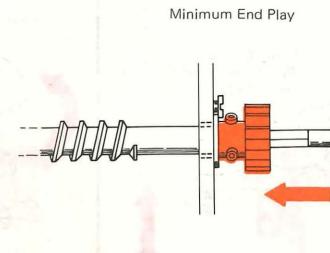
### 80 Velocity Magnet Assembly



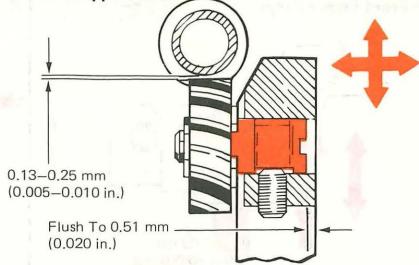
### 81 Velocity Slider Overthrow



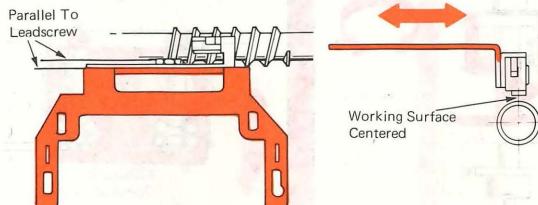
### 82 Leadscrew Ratchet



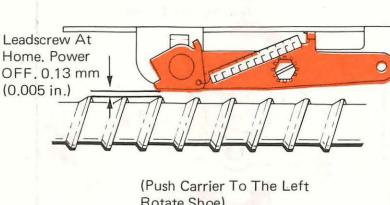
### 83 Leadscrew Support Gear



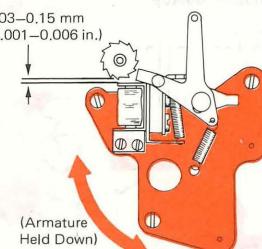
### 84 Escapement Bracket



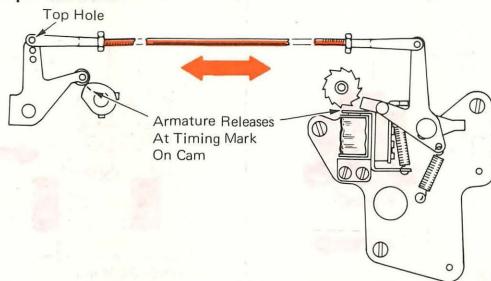
### 85 Leadscrew Shoe



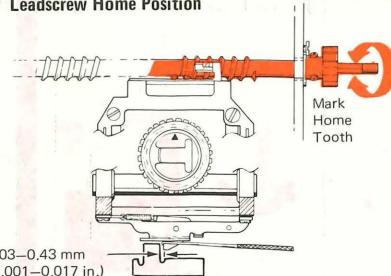
### 86 Escapement Magnet Plate



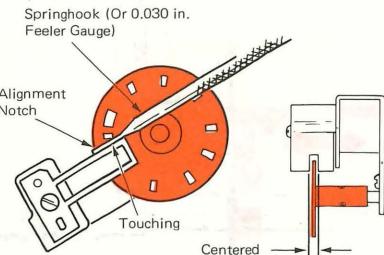
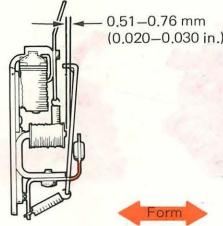
87 Escapement Link



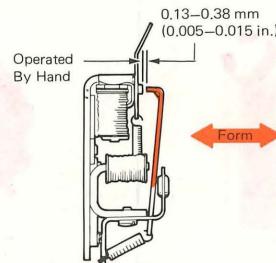
88 Leadscrew Home Position



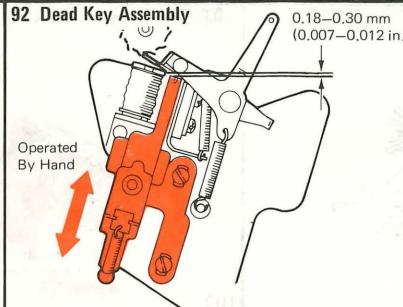
89 Emitter Wheel

90 Dead Key Magnet  
—Armature Upstop

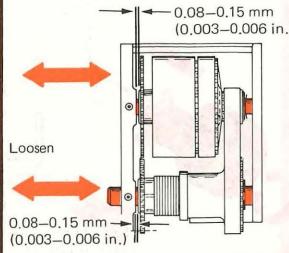
91 Dead Key Magnet—Armature



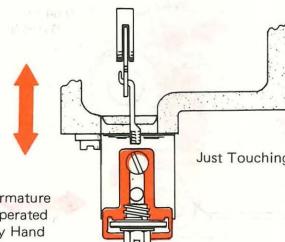
92 Dead Key Assembly



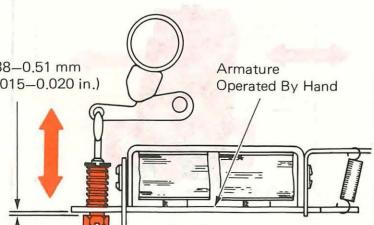
93 Clutch End Play



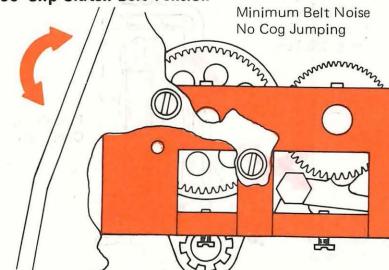
94 B/S Armature Upstop



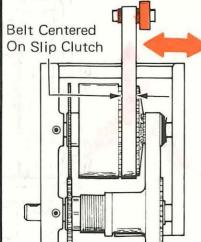
95 Backspace Link



96 Slip Clutch Belt Tension

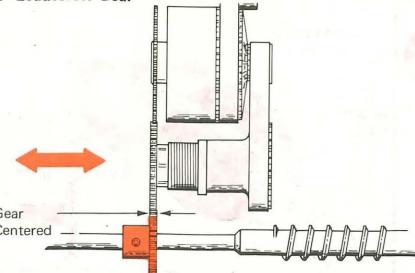


97 Leadscrew Drive Pulley

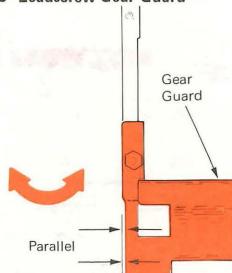


## -10- Backspace, Mainspring & Cords, Carrier Return

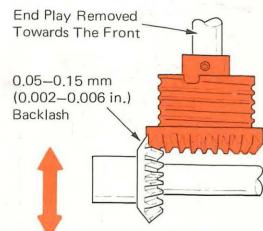
98 Leadscrew Gear



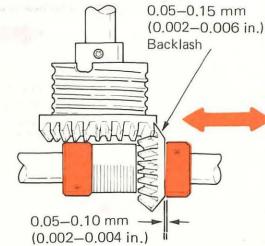
99 Leadscrew Gear Guard



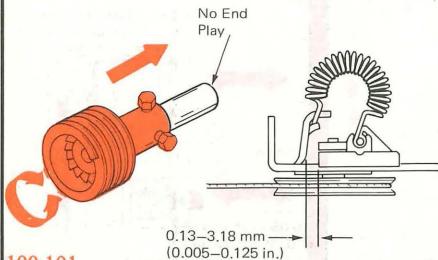
100 Tab Cord Drum



101 Tab Governor Pinion



102 Cord Tension

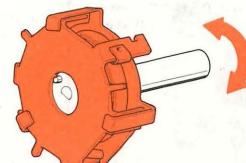


100,101

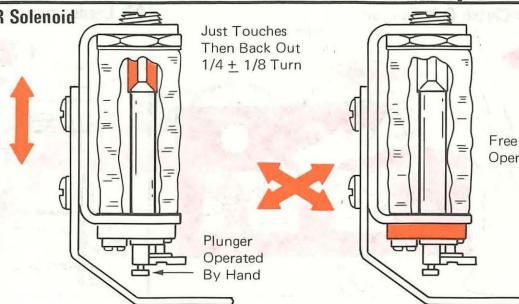
103 Idler Pulley Eccentric



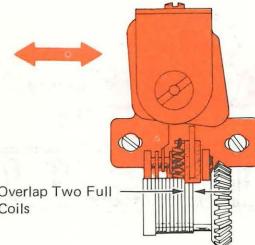
104 Mainspring



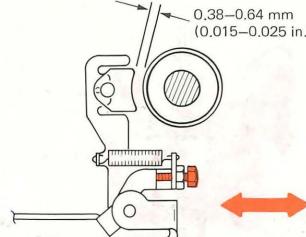
105 C/R Solenoid



106 C/R Solenoid Assembly

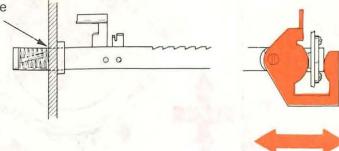


107 C/R Shoe Clearance



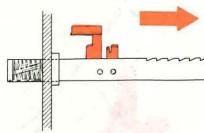
108 Margin Rack Position

Margin Rack  
Flush With  
Outside Of  
Side Frame



88

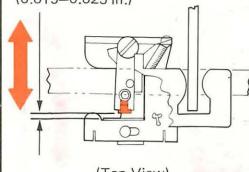
109 Margin Rack Final Stop



88

110 Overbank Switch Magnet

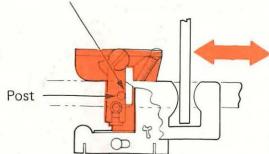
0.38–0.64 mm  
(0.015–0.025 in.)



(Top View)

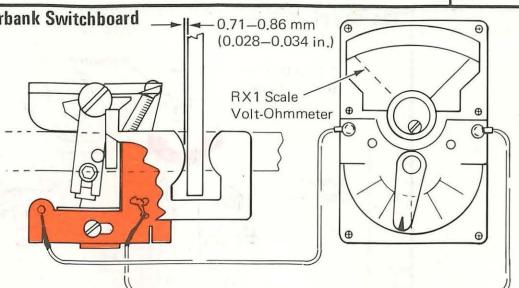
111 Overbank Switch Assembly

Just Touches At Rest



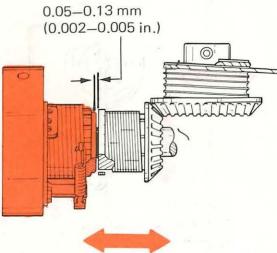
Post

112 Overbank Switchboard

RX1 Scale  
Volt-Ohmmeter

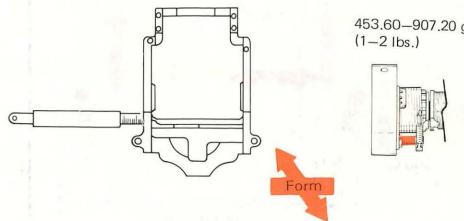
0.71–0.86 mm  
(0.028–0.034 in.)

113 Torque Limiter Arbor End Play



0.05–0.13 mm  
(0.002–0.005 in.)

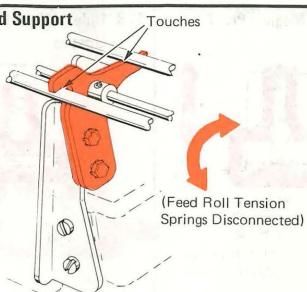
114 C/R Torque Limiter



453.60–907.20 g  
(1–2 lbs.)

Form

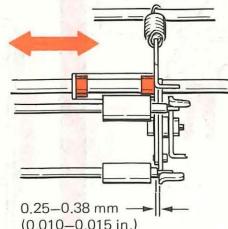
115 Paper Feed Support



Touches

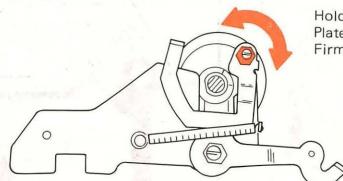
(Feed Roll Tension  
Springs Disconnected)

116 Feed Roll End Play



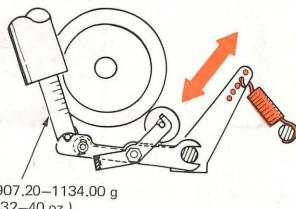
0.25–0.38 mm  
(0.010–0.015 in.)

117 Platen Latches



Holds  
Platen  
Firmly

118 Feed Roll Tension

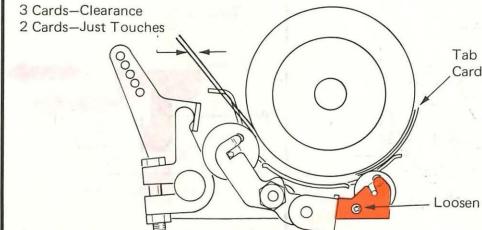


907.20–1134.00 g  
(32–40 oz.)

## -12- Paper Feed, Index

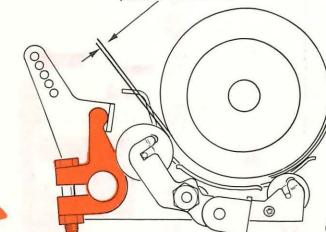
### 119 Feed Roll Adjustment

3 Cards—Clearance  
2 Cards—Just Touches



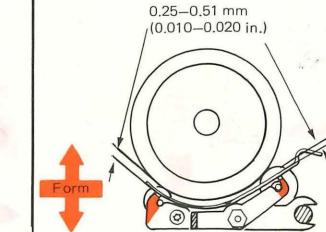
### 120 Paper Release

1.40–1.90 mm  
(0.055–0.075 in.)

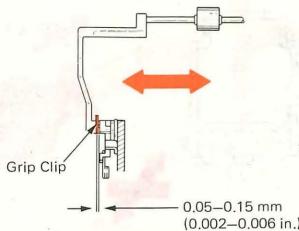


### 121 Deflector Clearance

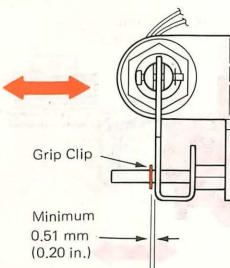
0.25–0.51 mm  
(0.010–0.020 in.)



### 122 Paper Bail Arm

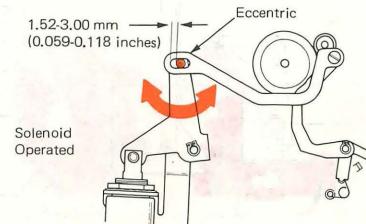


### 123 Bail Closer Bellcrank

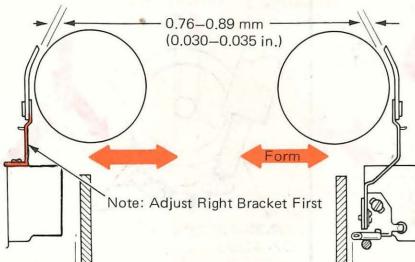


### 124 Bail Closer Eccentric

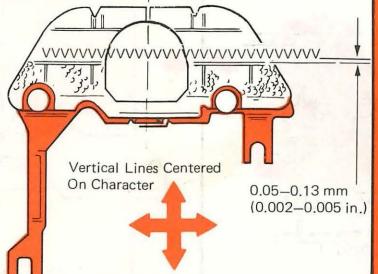
1.52–3.00 mm  
(0.059–0.118 inches)



### 125 Cardholder Bracket

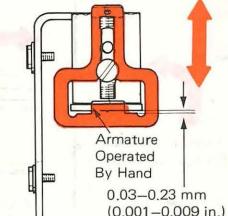


### 126 Cardholder

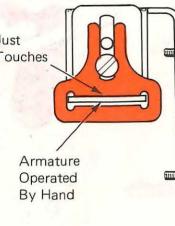


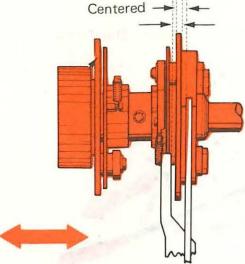
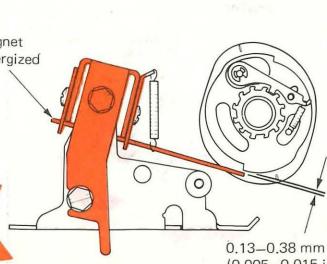
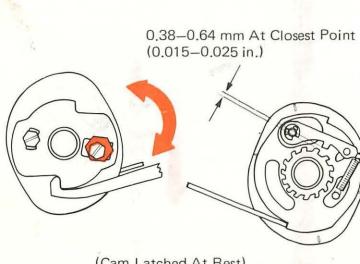
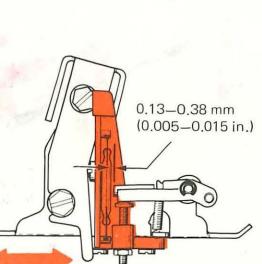
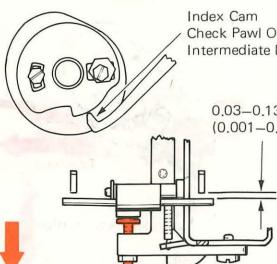
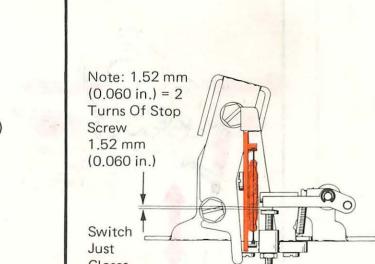
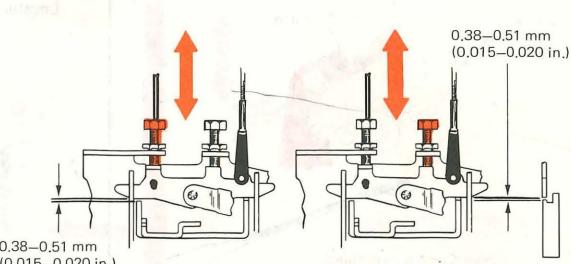
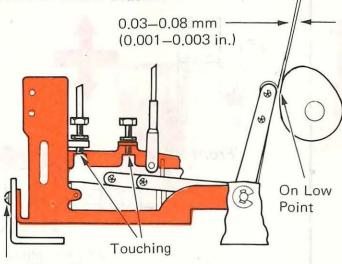
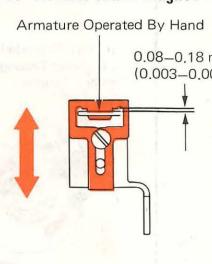
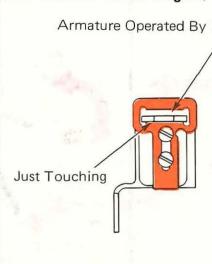
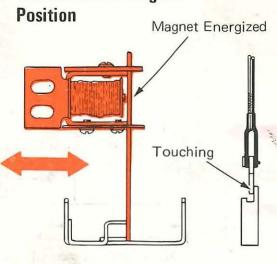
125

### 127 Index Magnet Pivot Plate



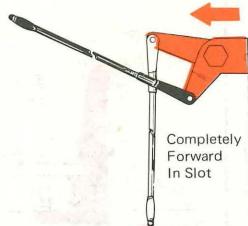
### 128 Index Magnet Armature Upstop



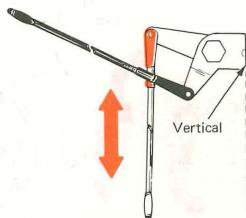
|  |   |  |   |
|--|---|--|---|
| <p><b>129 Index Cam Assembly</b></p>  <p>Centered</p> <p>Magnet Energized</p>   | <p><b>130 Index Cam Release Clearance</b></p>  <p>0.13–0.38 mm (0.005–0.015 in.)</p>   | <p><b>131 Index Clutch Pawl Clearance</b></p>  <p>0.38–0.64 mm At Closest Point (0.015–0.025 in.)</p> <p>(Cam Latched At Rest)</p> | <p><b>132 Index Feedback Magnet</b></p>  <p>0.13–0.38 mm (0.005–0.015 in.)</p>           |
| <p><b>133 Index Feedback Stop Screw</b></p>  <p>Index Cam<br/>Check Pawl On<br/>Intermediate Dwell</p> <p>0.03–0.13 mm (0.001–0.005 in.)</p>  | <p><b>134 Index Feedback Circuit Board</b></p>  <p>Note: 1.52 mm (0.060 in.) = 2 Turns Of Stop Screw<br/>1.52 mm (0.060 in.)</p> <p>Switch Just Closes</p> | <p><b>135 Index Lever Stop Screws</b></p>  <p>0.38–0.51 mm (0.015–0.020 in.)</p>   |   |
| <p><b>136 Reverse Index Bracket</b></p>  <p>0.03–0.08 mm (0.001–0.003 in.)</p> <p>On Low Point</p> <p>Loosen These Screws</p> <p>Touching</p> | <p><b>137 Reverse Index Magnet Pivot Plate</b></p>  <p>Armature Operated By Hand</p> <p>0.08–0.18 mm (0.003–0.007 in.)</p>                                 | <p><b>138 Reverse Index Magnet Upstop</b></p>  <p>Armature Operated By Hand</p> <p>Just Touching</p>                               | <p><b>139 Reverse Index Magnet Position</b></p>  <p>Magnet Energized</p> <p>Touching</p> |

-14- Index, Pinfeed Platen

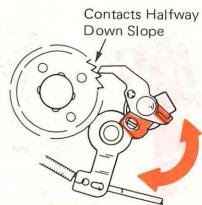
140 Reverse Index Intermediate Bellcrank



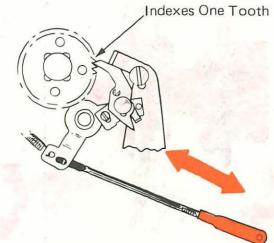
141 Reverse Index Intermediate Link



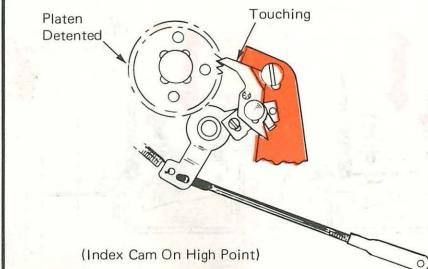
142 Reverse Index Pawl Locator



143 Reverse Index Link



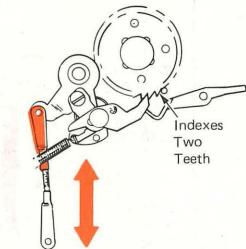
144 Reverse Overthrow Stop



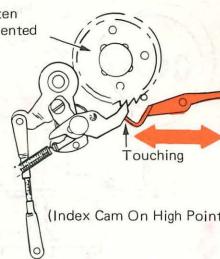
145 Forward Index Pawl Locator



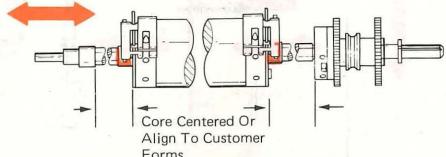
146 Forward Index Link



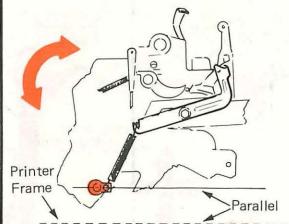
147 Forward Overthrow Stop



148 Pinfeed Platen Core—Lateral Position



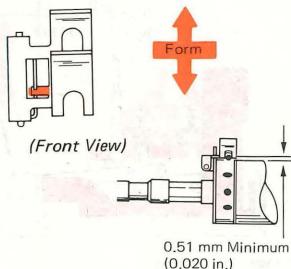
149 Detent Spring Anchor



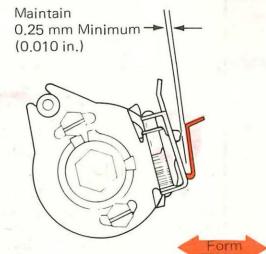
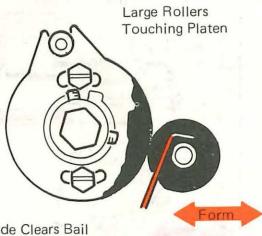
150 Pinwheel Assembly



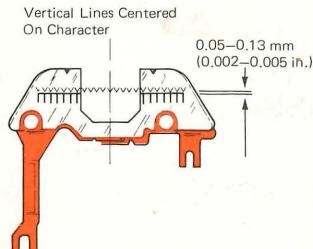
151 Paper Guide Latch



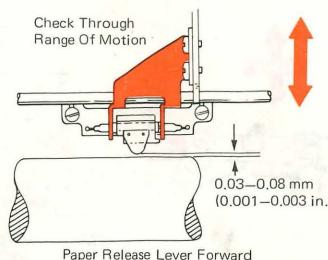
152 Paper Guides



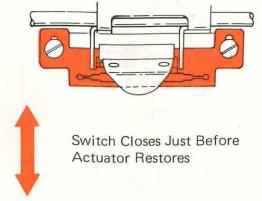
153 Pinfeed Cardholder



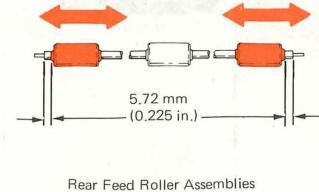
154 Actuator Bracket Assembly



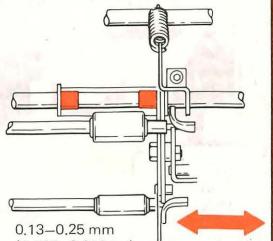
155 Actuator Reed Switch



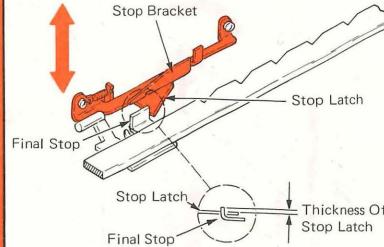
156 Feed Roll Assembly



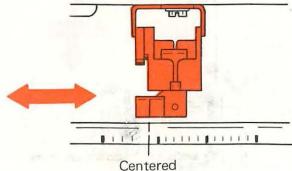
157 Feed Roll End Play



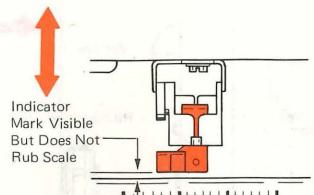
158 Margin Stop Bracket



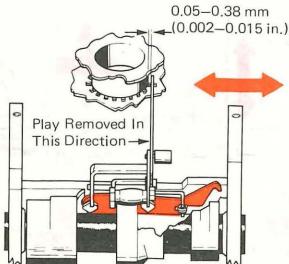
159 Carrier Pointer Left-To-Right



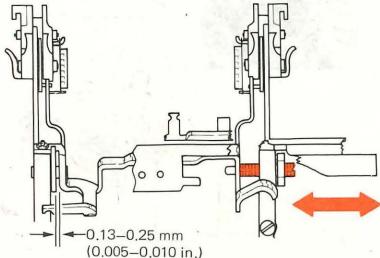
Carrier Pointer Front-To-Rear



160 Feed Cam Follower Bracket

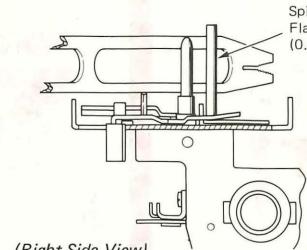
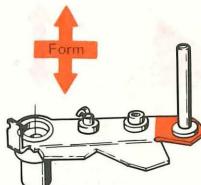


161 Lift Arm

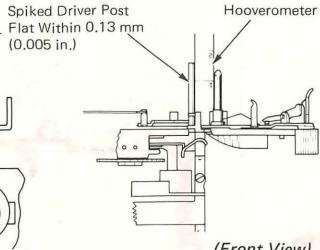


## -16- Selective Ribbon

### 162 Spiked Driver Post

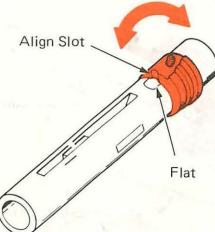


(Right Side View)



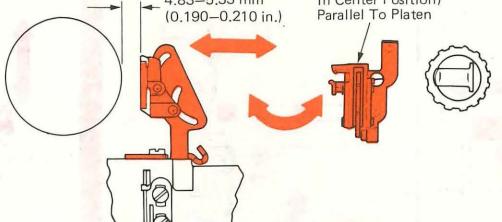
(Front View)

### 165 Ribbon Lift Cam



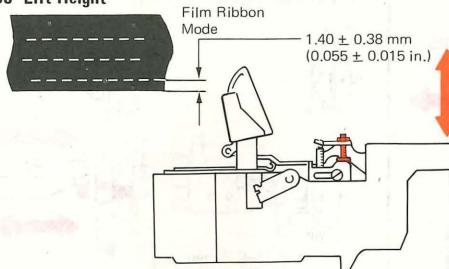
54

### 166 Ribbon Lift Guide

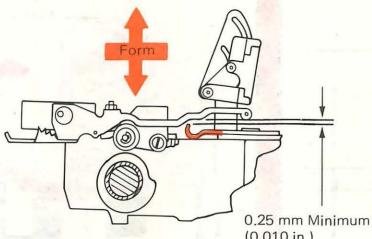


(Machine Half Cycled Ribbon In Center Position)

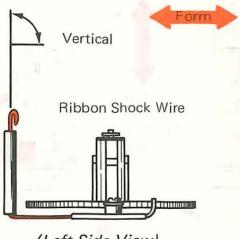
### 168 Lift Height



### 169 Lift Arm Lower Stop

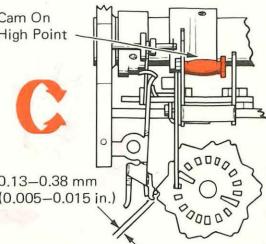


### 170 Shock Wire



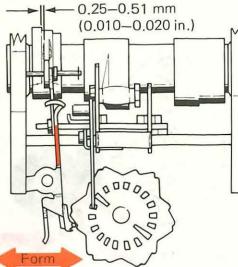
(Left Side View)

### 163 Feed Cam Follower Eccentric

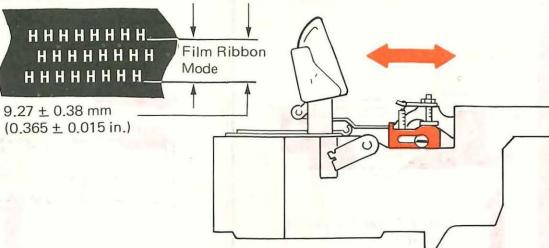


C

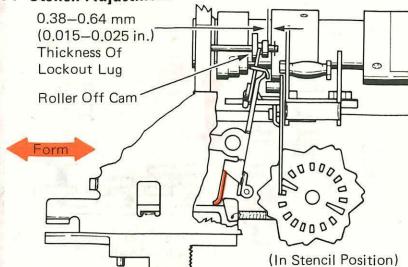
### 164 Lift Control Lever



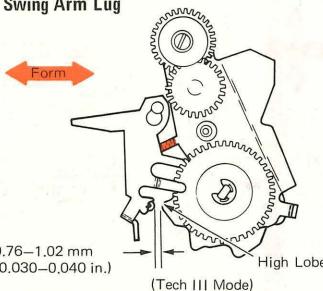
### 167 Spread Adjusting Plate



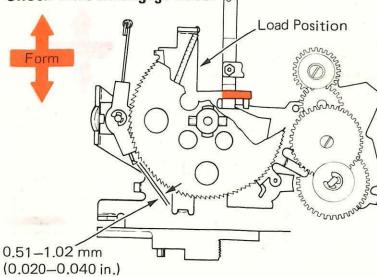
## 171 Stencil Adjustment



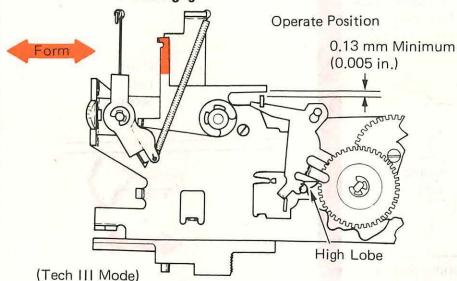
## 172 Swing Arm Lug



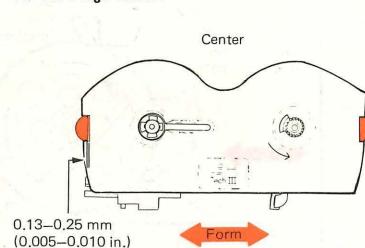
## 173 Shock Wire Disengage Lever



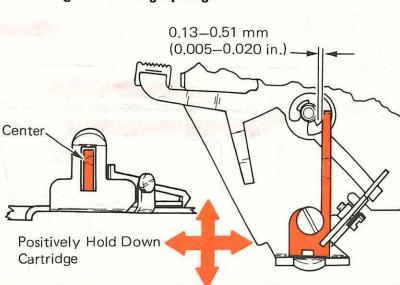
## 174 Shock Wire Disengage Lever



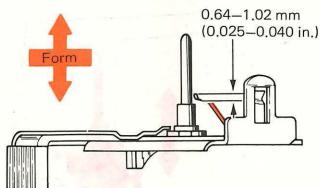
## 175 Cartridge Guides



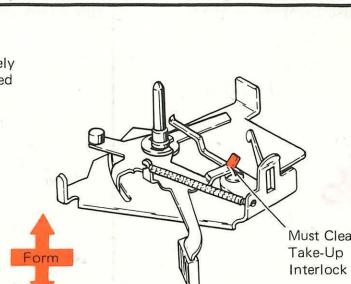
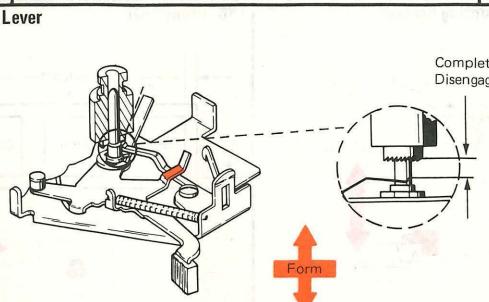
## 176 Cartridge Retaining Springs



## 177 Take-Up Core Interlock



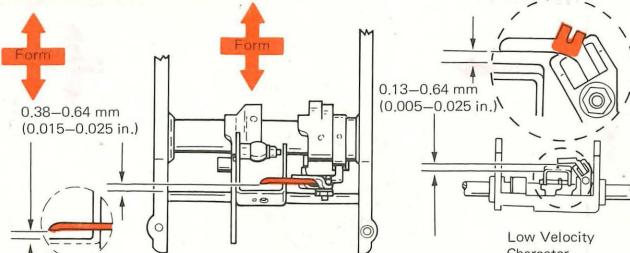
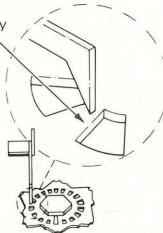
## 178 Load Lever



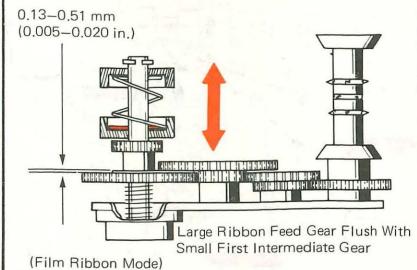
## 18- Selective Ribbon, EOR, Covers

### 179 Ribbon Feed Inhibitor

Pawl Resets Not  
More Than 1/2 Way  
To Next Window  
During No Print  
Operation

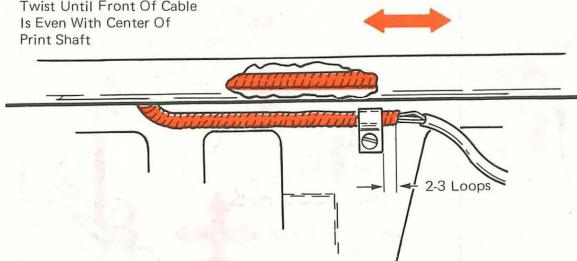


### 180 Mode Button Grip Clip Position

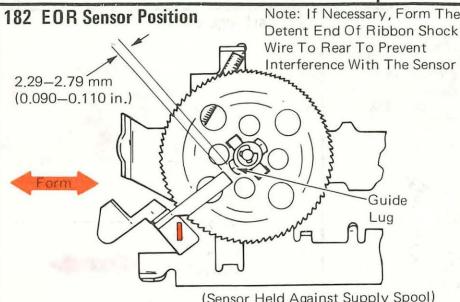


### 181 Cable Position

Twist Until Front Of Cable  
Is Even With Center Of  
Print Shaft



### 182 EOR Sensor Position



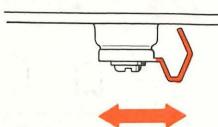
Note: If Necessary, Form The  
Detent End Of Ribbon Shock  
Wire To Rear To Prevent  
Interference With The Sensor

Guide Lug

(Sensor Held Against Supply Spool)

### 183 Top Cover Latch

Cover  
Latches  
Securely

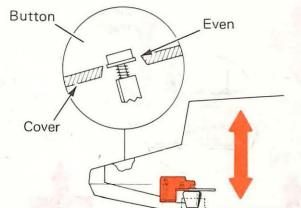


### 184 Paper Release Lever

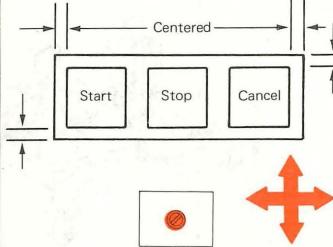
Centered In  
Opening



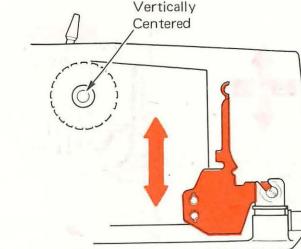
### 185 Front Mounting Bracket



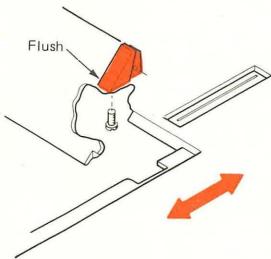
### 186 Front Feet



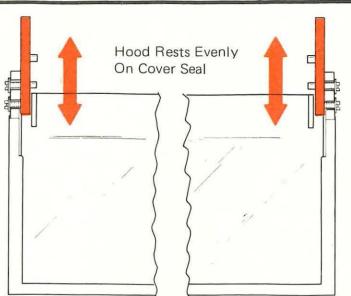
### 187 Rear Mounting Brackets



188 Mounting Plates



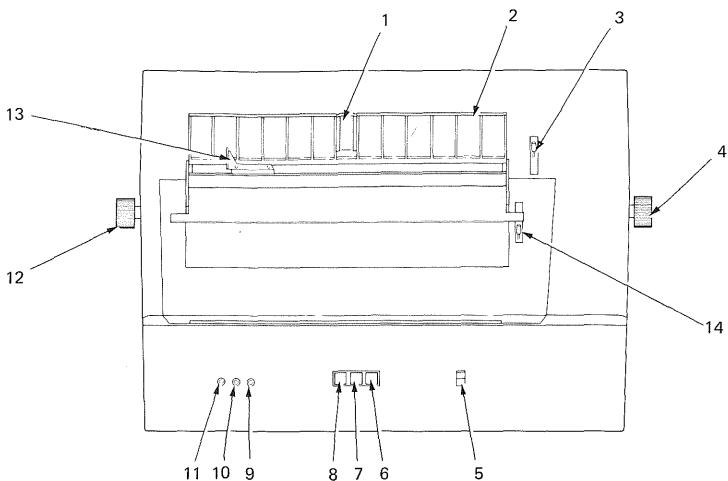
189 Hood



Refer to this chart when performing the functional check.

**CAUTION**

To prevent unexpected motor starts, always unplug the power saver relay connectors from the CE connector when servicing the printer.



|                        |                                   |
|------------------------|-----------------------------------|
| 1. Page End Indicator  | 8. START Button                   |
| 2. Paper Support Table | 9. Ribbon Light                   |
| 3. Paper Release Lever | 10. Ready Light                   |
| 4. Platen Knob         | 11. Power Light                   |
| 5. On/Off Switch       | 12. Platen Knob & Platen Variable |
| 6. CANCEL Button       | 13. Paper Guide                   |
| 7. STOP Button         | 14. Paper Bail Lever              |

## 22- Functional Check

### Functional Check

This functional check procedure will indicate whether or not the printer has a failure. It includes organized checks of every function of the machine in an efficient sequence. Using this procedure on every service call will help locate failures, and it will ensure the machine is working properly after repairs are made.

1. Visual Inspection – Examine the machine for any obviously loose, damaged or missing parts. Also look for foreign material in the machine: pencils, erasers, paper clips, etc.
2. Paper Insertion – Roll a single piece of paper into the machine. It should not wrinkle or tear.
3. Paper Release – Pull the paper bail forward. Notice that the feed rolls still hold the paper firmly. Now, pull the paper release lever forward. You should be able to easily reposition the paper left and right.
4. Platen Variable – Push in the left platen knob. The platen should now turn freely; the ratchet on the right end of the platen should not turn. When the knob is released, the platen should detent reliably.
5. On/Off Switch – Turn power off then back on. The printer AC motor should start and the power supply fan should be running. This is an indication the AC power to the printer and power supply is good.
6. Load the CE diagnostic diskette on the system and select the printer exerciser. With the impression control on 3, roll a single sheet of bond paper in the machine. Place the paper bail forward against the platen.

Press the START button on the operator control panel. The first functional test should print out.

7. Operator Control Panel – Press the CANCEL button, then the START button. The second functional test should begin printing.

Using the START, STOP and CANCEL buttons, play out all of the remaining functional tests.

8. Print Quality – Check the functional test payout. All characters should have even color. No character should be obviously out of position. There should be even spacing between characters with no overlap.

### 9. Selective Ribbon System

- A. Inspect the copy for ribbon flaking; that is, splattering of ribbon particles on the copy.
- B. With a film ribbon installed on your machine, the lift pattern should look like this:



Inspect the lift pattern on the machine. The characters should not overlap one another, and the characters should be positioned on the ribbon with a margin of safety at the top and bottom.

With a Tech III ribbon installed on the machine, inspect the ribbon pattern. The characters should overlap one another and there should be a margin of safety at the

top and bottom of the ribbon. The printing must not fade.

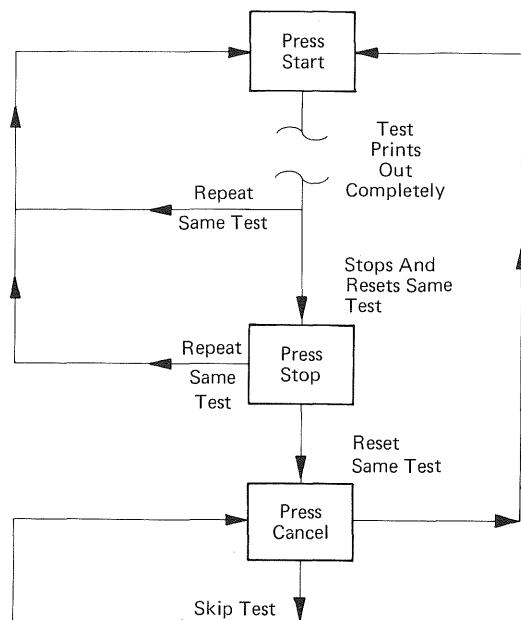
- C. Inspect the ribbon throughout its path around the various guides and rollers. There should be no creases in the ribbon.

- D. Place the stencil control lever in the stencil position and print several characters. The ribbon should not feed or lift.

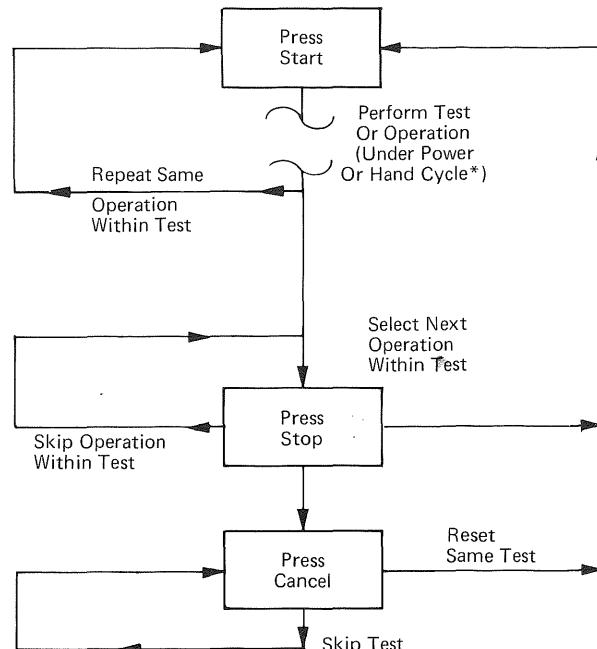
10. Reset the impression control to its original position.

A complete functional exercise of the printer can be performed by loading the CE diagnostic diskette and selecting the printer exercise from the diskette. Individual exercises within the test may be repeated to aid in troubleshooting and to verify correct operation of the printer after a repair has been performed. Tests will be printed in 10 pitch.

## FUNCTIONAL TEST



#### DIAGNOSTIC/ADJUSTMENT TEST



\*CE Jumper Removed and CE Service Connector Unplugged

a PRINT SAMPLE TEST

```
The formula for water is H2O.
The quick brown fox jumped over the lazy dog's back.
Ten spaced tabs 1234567890,-!:!½=
1   2   3   4   5   6   7   8   9   0
THE FORMULA FOR WATER IS H2O.
THE QUICK BROWN FOX JUMPED2 OVER THE LAZY DOG'S BACK.
TEN SPACED TABS !@#$%^&*() +
!   @   #   $   %   ¢   &   *   (   )
```

**b CUSTOMER PRINT TEST**

abcde \_\_\_\_\_ a b c d e a b c

**C SPACE/BACKSPACE TEST**

## d SHIFT TEST

e TAB TEST

|      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|
| 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 0    |
| 11   | 22   | 33   | 44   | 55   | 66   | 77   | 88   | 99   | 00   |
| 111  | 222  | 333  | 444  | 555  | 666  | 777  | 888  | 999  | 000  |
| 1111 | 2222 | 3333 | 4444 | 5555 | 6666 | 7777 | 8888 | 9999 | 0000 |
| 111  | 222  | 333  | 444  | 555  | 666  | 777  | 888  | 999  | 000  |
| 11   | 22   | 33   | 44   | 55   | 66   | 77   | 88   | 99   | 00   |
| 1    | 2    | 3    | 4    | 5    | 7    | 8    | 9    | 0    |      |

### f WORD underscore TEST

Now is the time for all good citizens to come to the aid of their country.

## g OVERBANK TEST

OVERBANK

## **h REVERSE INDEX TEST**

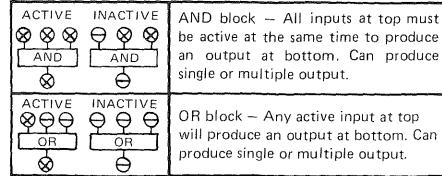
The green grass grew on the side of a hill. The bells can be heard any time of day. Zebra run freely on the plain. jungle

we if give a little extra.

men, victory ours is quickly Will we ever conquer the world? Some say yes, others say no.

## FUNCTION CHART SYMBOLS

|  |   |
|--|---|
|  | An electrical or mechanical assembly is activated (solenoids, relays, motors).  |
|  | An electrical or mechanical assembly is returned to the inactive state.   |
|  | An electronic assembly is operated (power supplies, transistors, etc.).   |
|  | An electronic assembly returns to its unoperated or normal condition.   |
|  | Connector (accessory connector, M-connector, etc.).   |
|  | Time delay.   |
|  | Indicates a line that starts or is continued elsewhere. (A note will specify where.)  |
|  | Indicates a note about a particular point or component.   |
|  | Circuit board, planar package, etc. (Name of board, etc., will be indicated.)   |
|  | Test point.   |
|  | The dotted line indicates that there is a mechanical connection between the two operations.   |
|  | Used to show all contact-type components and solid logic signals. The condition (N/C, N/O, etc.) of these components or signals will be indicated in the bracket. |
|  | Decision block.   |

Solenoids  
Operated

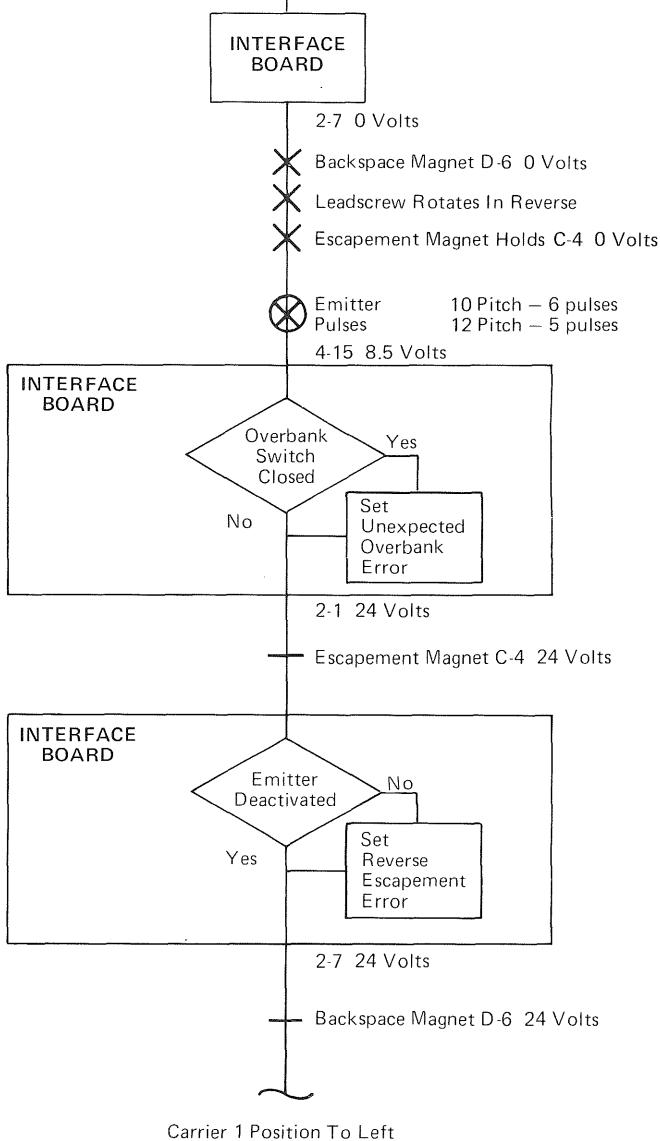
|    |     |     |     |     |    |      |     |     |     |     |    |
|----|-----|-----|-----|-----|----|------|-----|-----|-----|-----|----|
|    | R1  | R2  | R1  | -   | R1 | R1   | R2  | R1  | -   | R1  | -  |
|    | R2  | -   | -   | -   | R2 | -    | R2  | R2A | -   | R2A | -  |
|    | R2A | R2A | R2A | R2A | -  | R2A  | R2A | R2A | R2A | -   | -  |
|    | R5  | R5  | R5  | R5  | -  | R5   | R5  | R5  | R5  | -   | -  |
| T1 | [   | #   | &   | *   | \$ | Z    | @   | %   | ¢   | )   | (  |
| T2 | ]   | 3   | 7   | 8   | 4  |      | 2   | 5   | 6   | 0   | 9  |
| -  | X   | U   | D   | C   | L  | T    | N   | E   | K   | H   | B  |
| T2 |     |     |     |     |    |      |     |     |     |     |    |
| T1 | M   | V   | R   | A   | O  | O    | !   | *   | I   | S   | W  |
| -  |     |     |     |     |    |      |     |     |     |     |    |
| -  | G   | F   | :   | ;   | ?  | J    | /   | =   | P   | Q   | Y  |
| -  |     |     |     |     |    |      |     |     |     |     |    |
|    | -5  | -4  | -3  | -2  | -1 | Home | +1  | +2  | +3  | +4  | +5 |

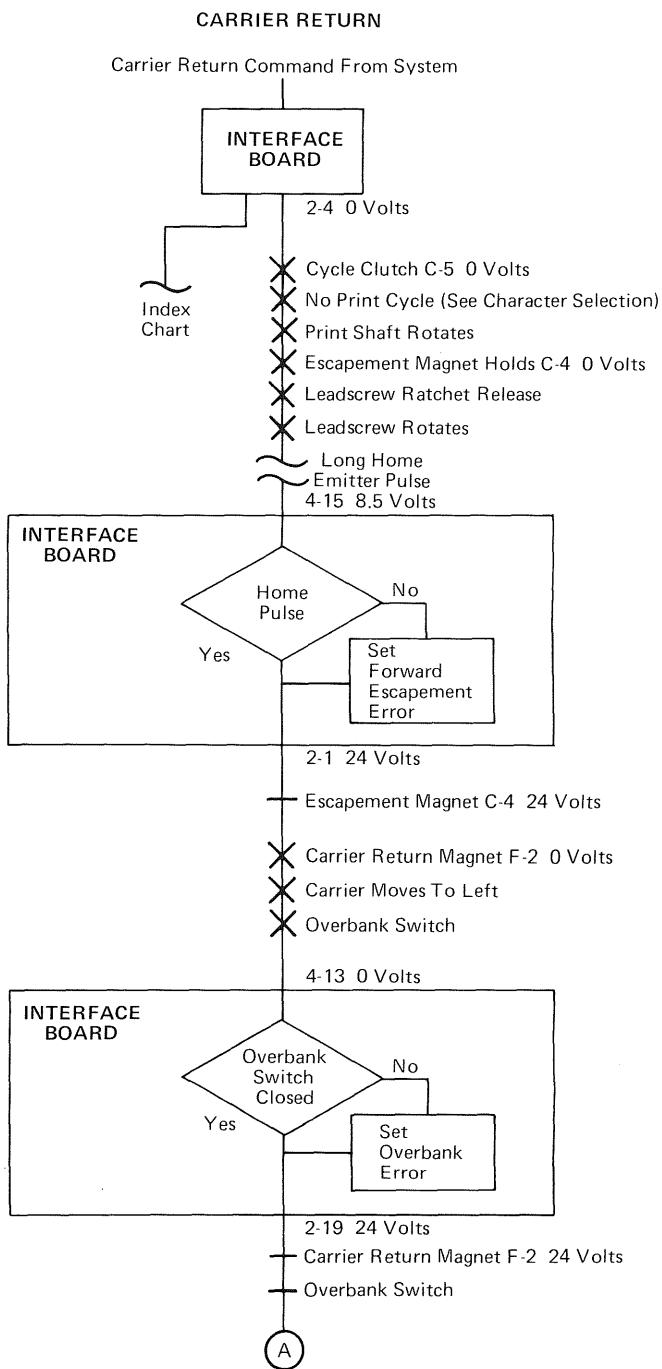
← Typehead  
Selection

Space and Tab... T1, T2, R1, R2, &amp; R2A

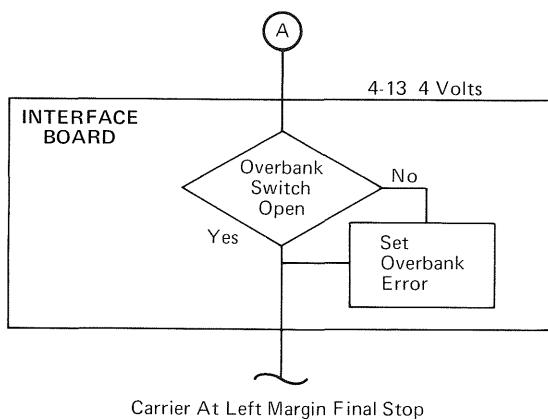
## BACKSPACE

Backspace Command From System

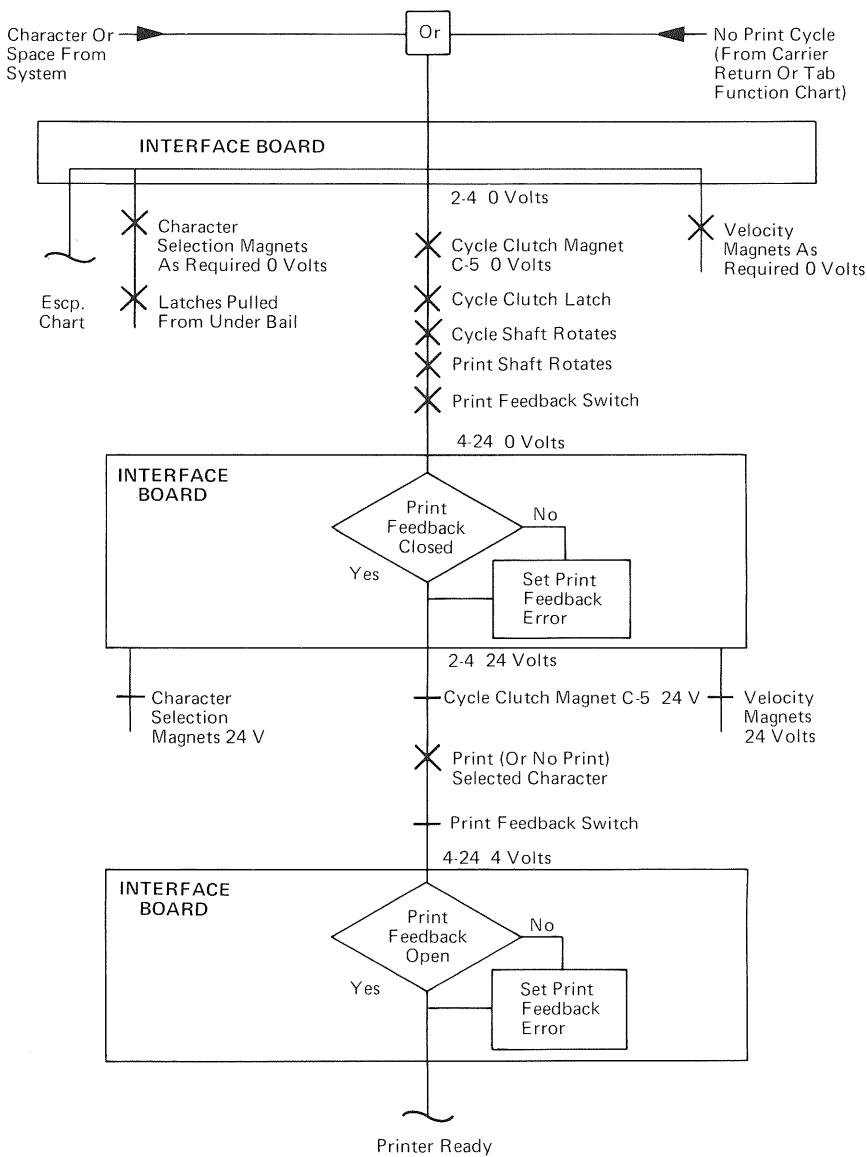




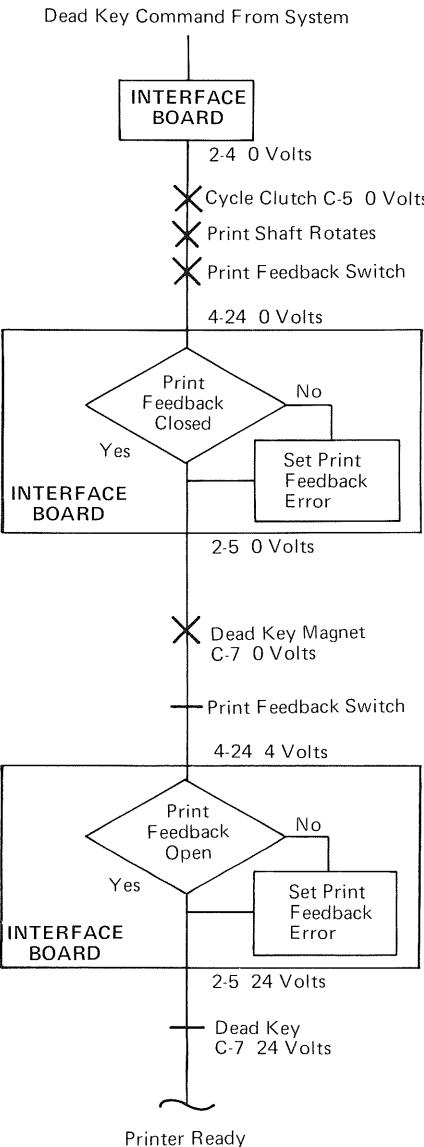
CARRIER RETURN (CONT)



CHARACTER SELECTION

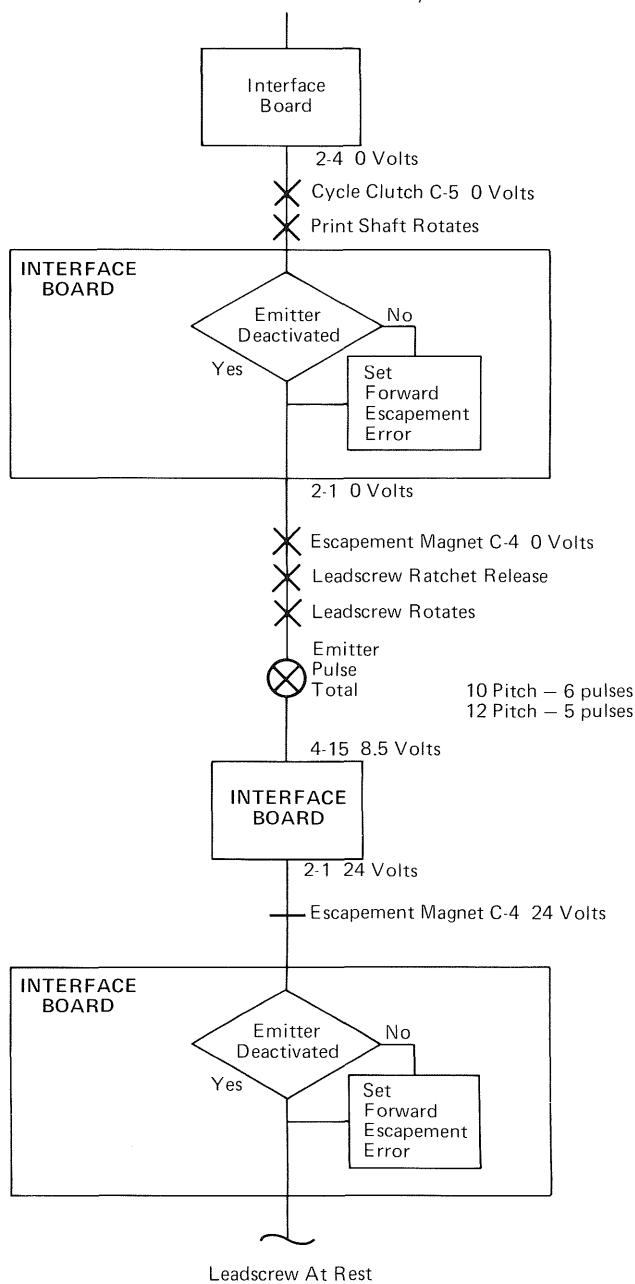


## DEAD KEY CYCLE

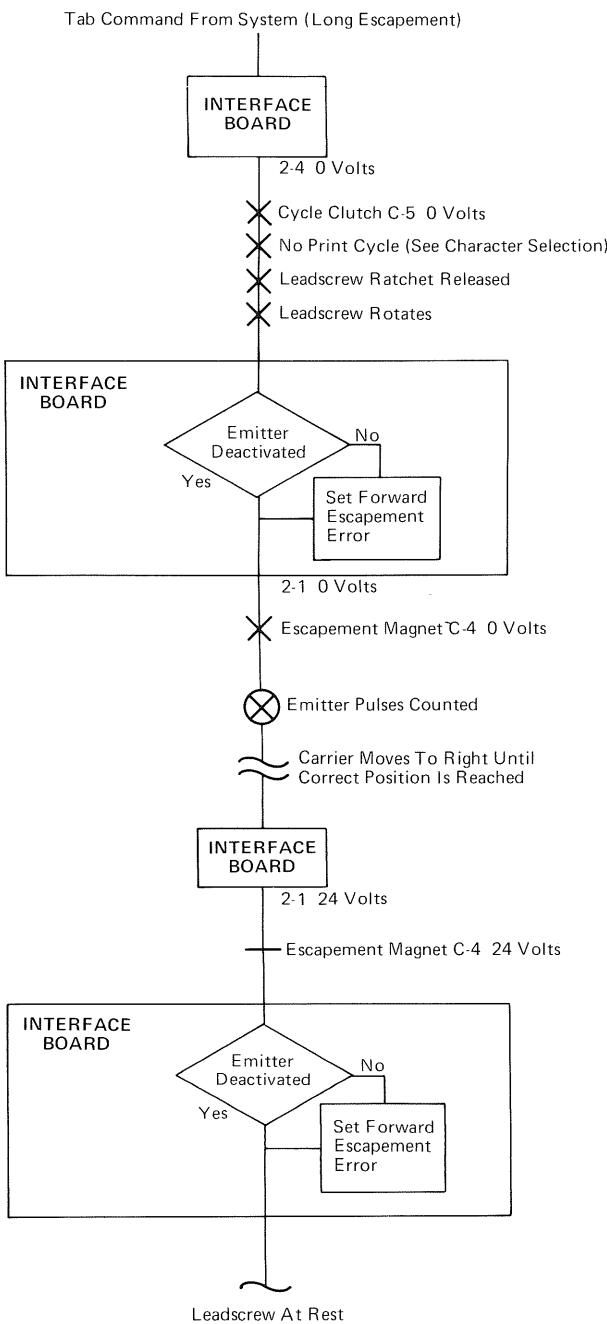


## ESCAPEMENT

Print Character Command From System



TAB



## INDEX

Index Command From System

INTERFACE BOARD

1/2 Index Forward

No

3-6 0 Volts

4-16 0 Volts

Rev Index Magnet F-6 0 Volts

For/Rev Selector Lever Rotates

Index Magnet F-1 0 Volts

Index Cam Rotates

INTERFACE BOARD

Index Feedback Switch

4-24 0 Volts

Platen Rotates 1 Tooth Reverse

Index Feedback Closed

No

Set Index Feedback Error

3-6 24 Volts

4-16 24 Volts

Reverse Index Magnet F-6 24 Volts

Index Magnet F-1 24 Volts

Index Feedback Switch

4-24 4 Volts

INTERFACE BOARD

Index Feedback Open

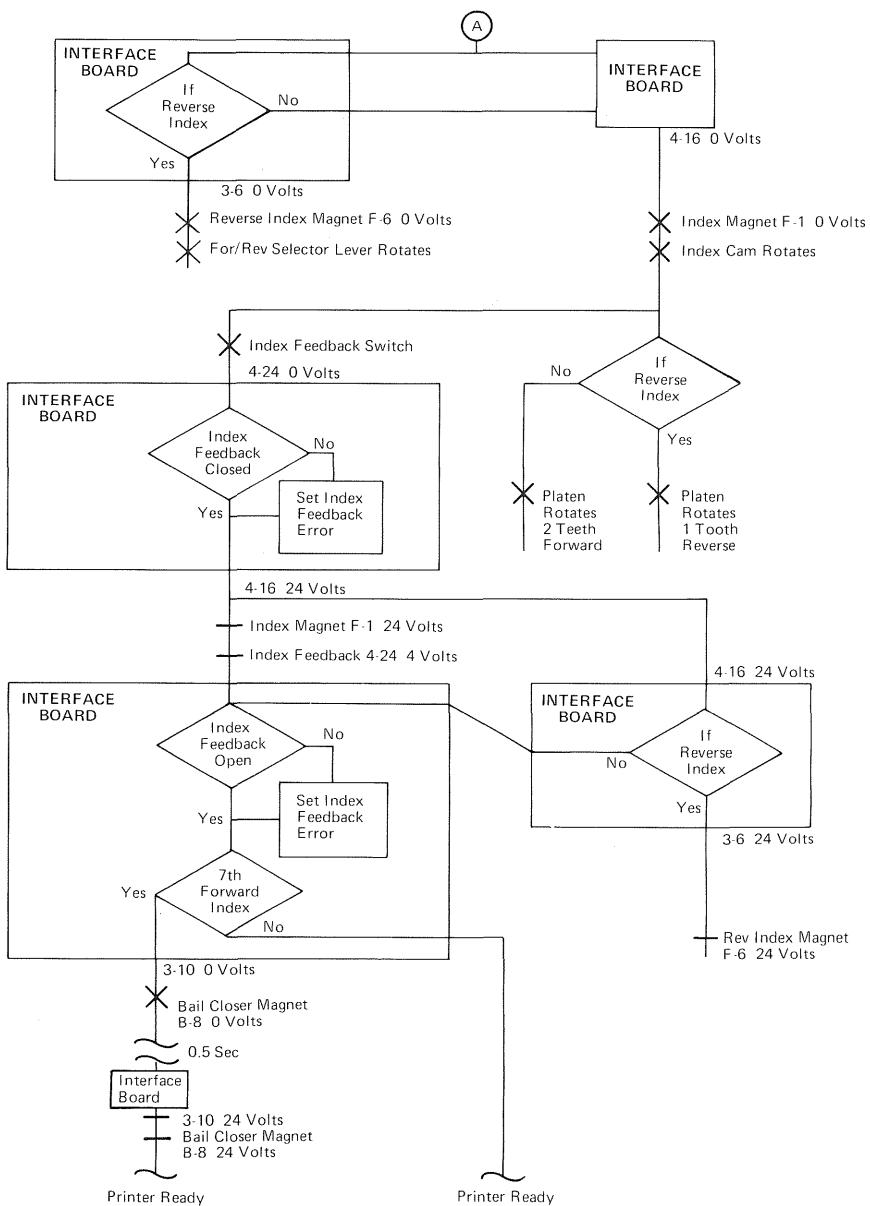
No

Yes

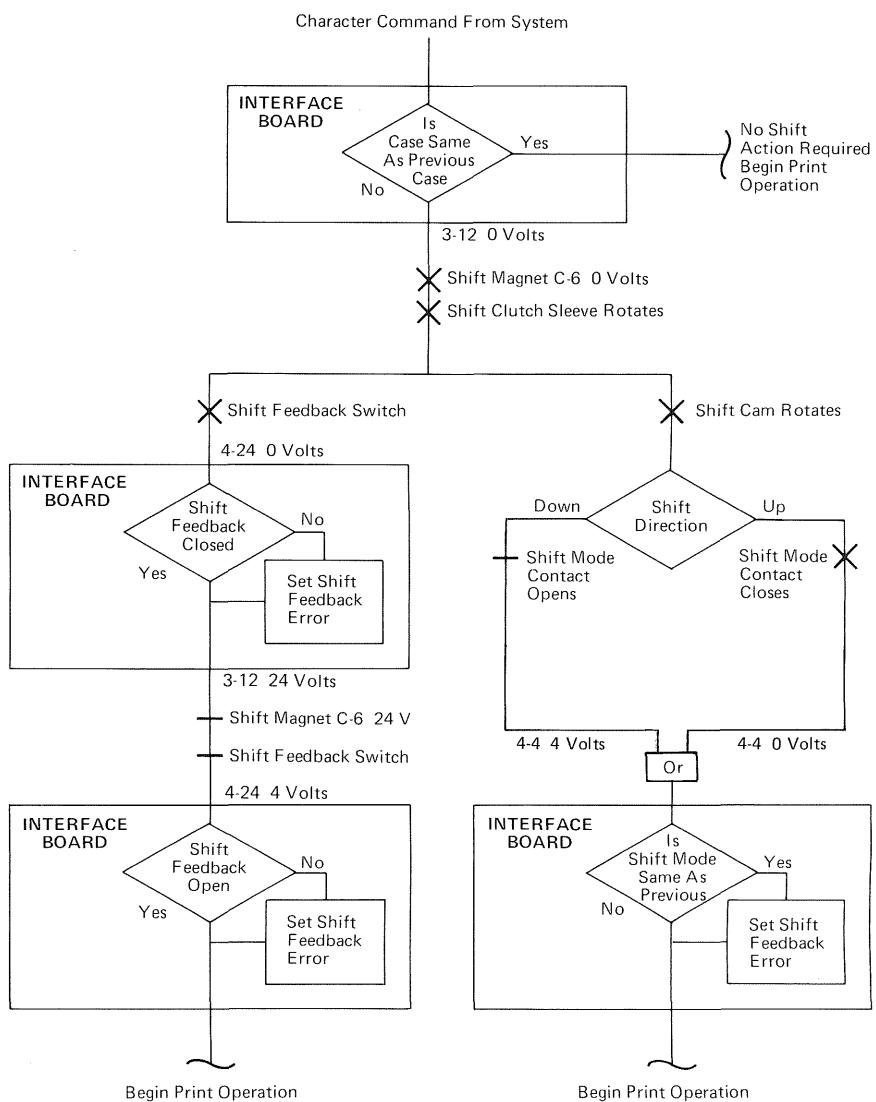
Set Index Feedback Error

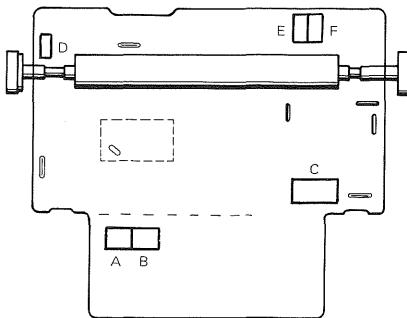
A

INDEX (CONTINUED)

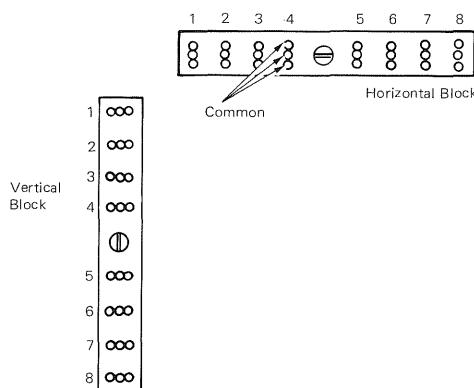


PRINTER SHIFT CYCLE

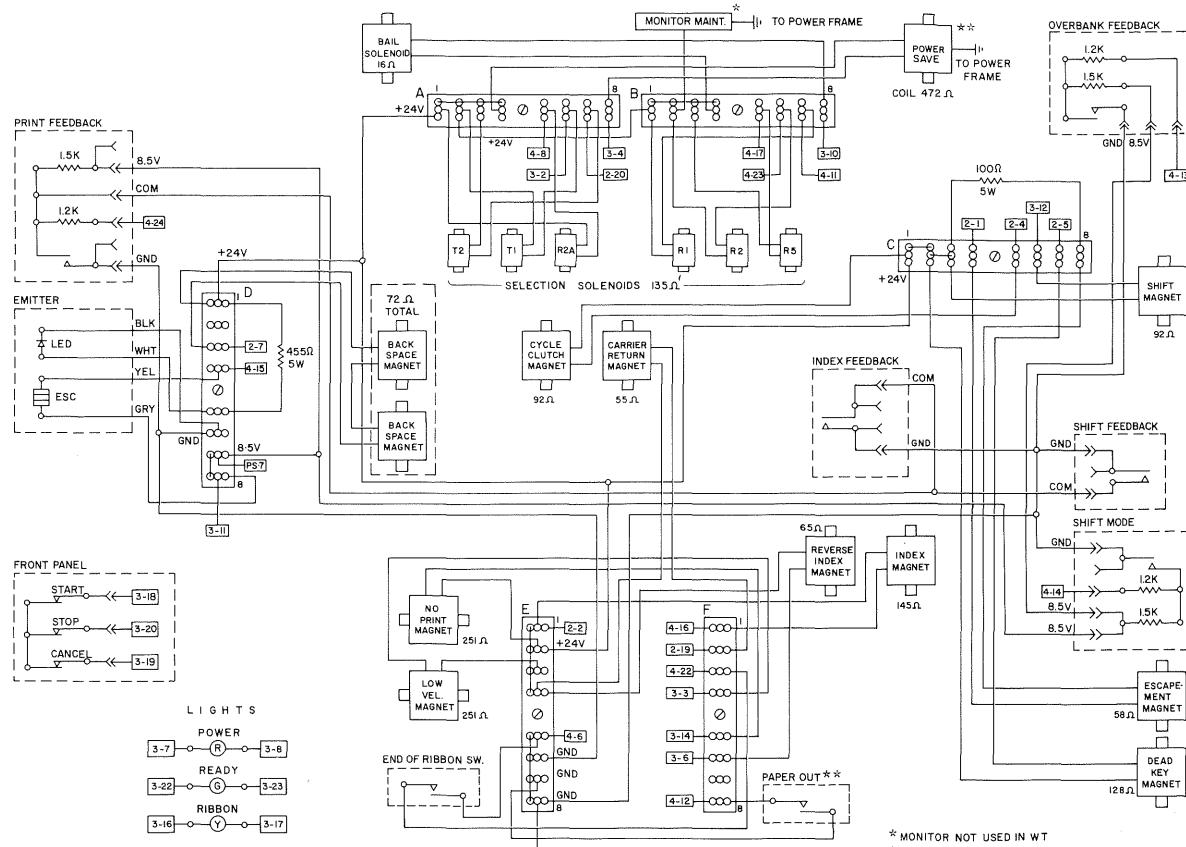




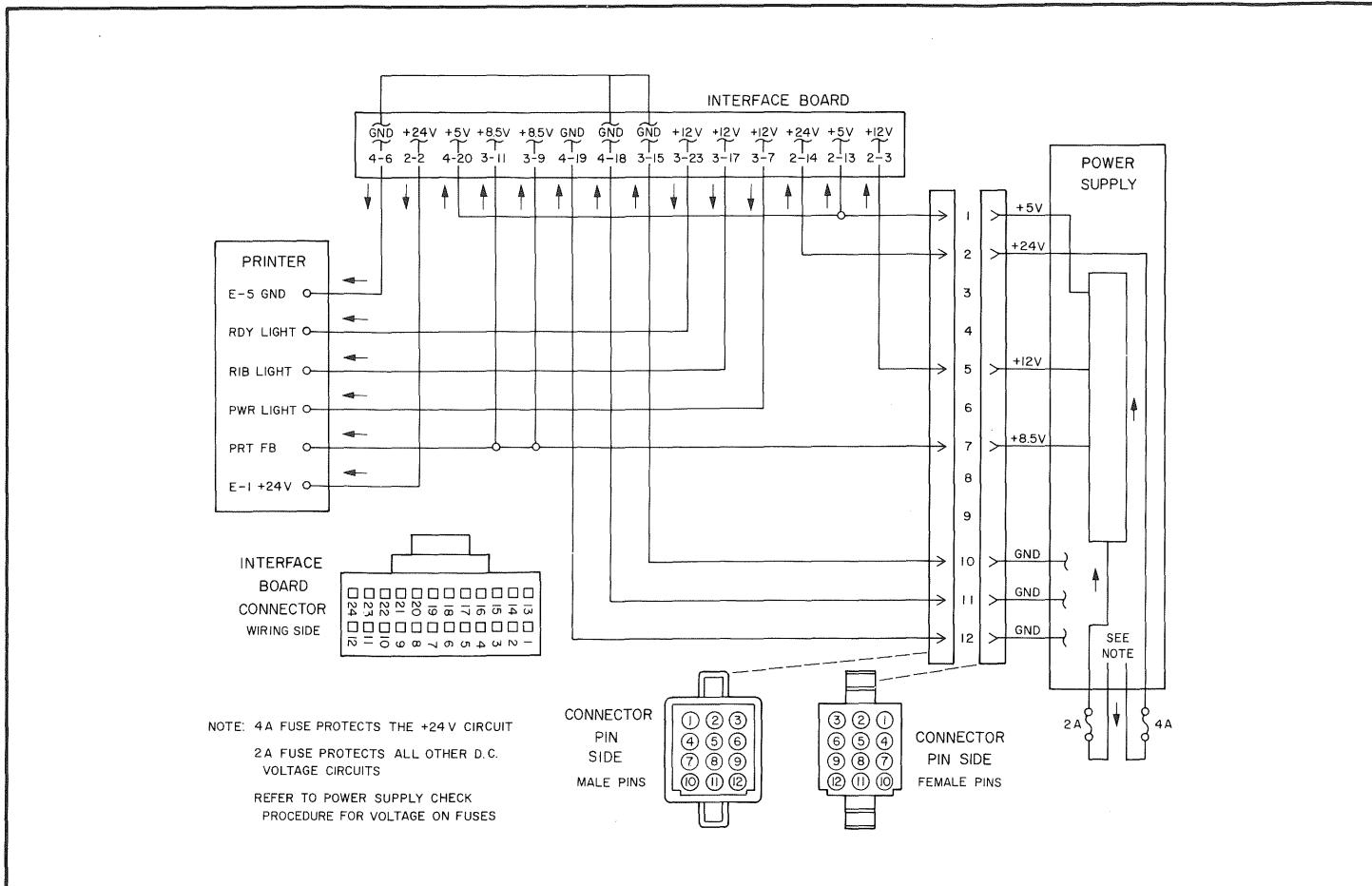
Terminal Block Locations

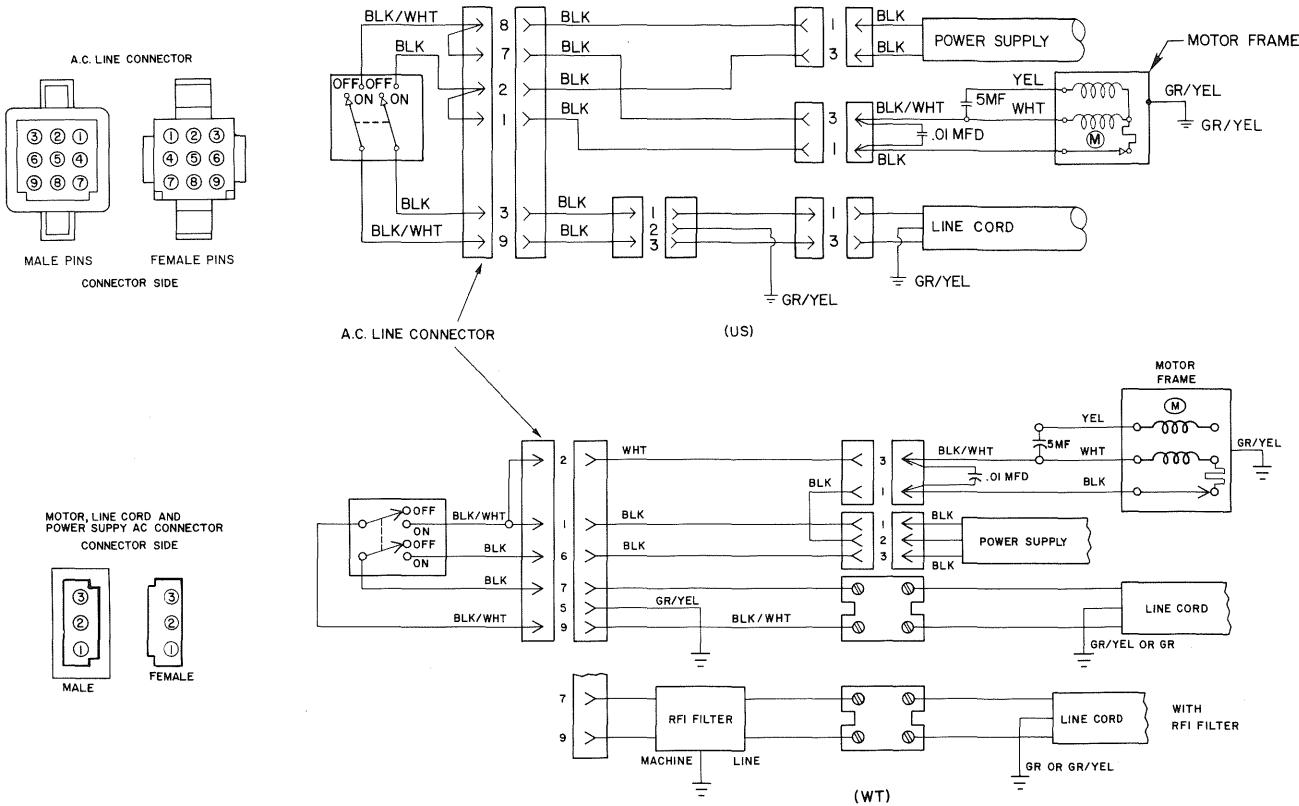


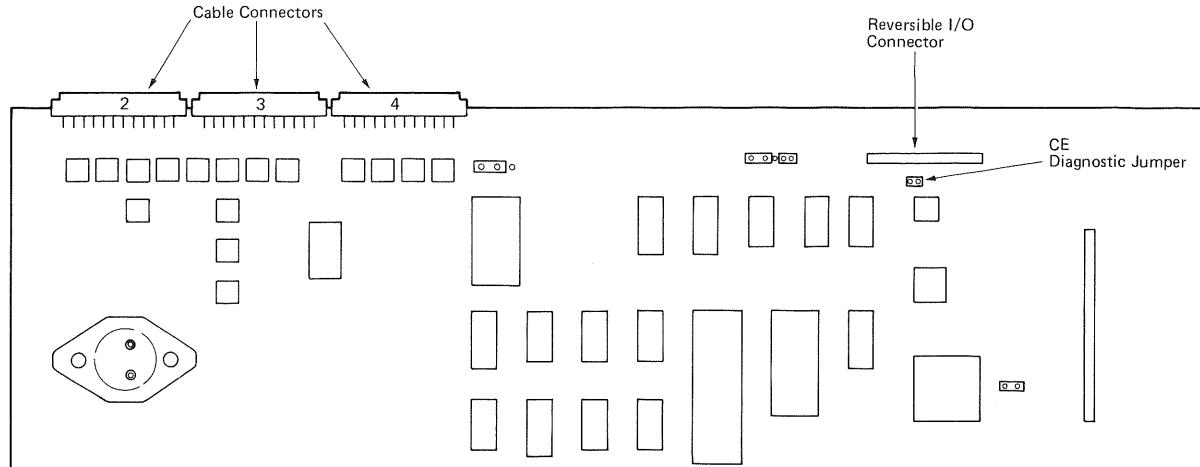
Terminal Block Numbering



\* MONITOR NOT USED IN WT  
\*IF INSTALLED







Interface Board

## Data Wrap

The "Selectric" Element Printer permits two types of data wrap tests; however, both must be started by the system.

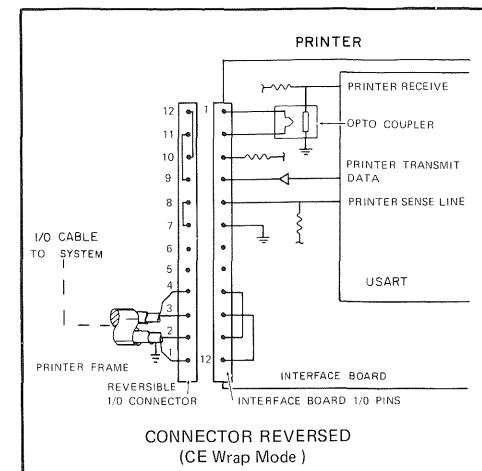
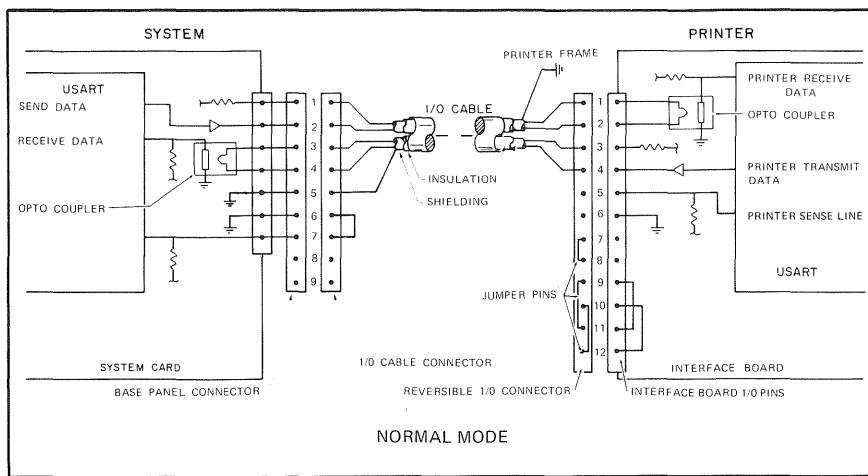
To ensure data can be successfully exchanged before an actual print job is started, the first test is performed automatically by the system before it begins to use the printer. Eight data bytes are sent to the printer and wrapped through a portion of the printer interface board and returned to the system. These data bytes are transferred on a one-for-one basis. The system will send one byte and wait for it to be returned before the next byte is

transmitted. This supplies a limited checkout of the printer electronics and the printer-to-system cable.

The second test is performed by the CE for diagnostic purposes if the first test should fail. The connector located on the printer interface board can be removed and turned around or reversed for this test. When the connector is reversed, all data transmitted to the printer is sent back to the system without going through any of the printer electronics. During this test, the printer interface board pin 5 is shorted to ground through connector pins 7 and 8 to interface pin 6. This causes the

printer sense line signal to go to approximately 0 VDC. By grounding this line the printer electronics is notified that the connector is physically reversed.

If the first type of test fails and the second succeeds, the problem is in the printer. If both fail, the problem is most likely in the system or the cable between the printer and the system. If both tests pass, and the failure is still present, it could be in either the printer, cable or the system. Additional diagnostic testing would then be required to isolate the problem and repair the failing equipment.



PRINTER/SYSTEM INTERFACE

## POWER SUPPLY CHECK PROCEDURE

### FUSE CHECK (VOLTAGE WITH POWER ON)

#### 30 VDC Scale

- 4 amp fuse – 24 VDC both end caps to ground.
- 2 amp fuse – 9.5 to 16 VDC both end caps to ground.
- If no voltage present, check primary fuse.

### FUSE CHECK (RESISTANCE WITH POWER OFF)

RX1 Scale – 0 ohms between end caps with fuse disconnected from its circuit.

### AFTER REPLACING A BLOWN FUSE AND BEFORE APPLYING POWER:

1. All power off – disconnect 12-position power supply connector.
2. Power on
  - A. Fuse blown – replace power supply.
  - B. Fuse OK – go to step 3.
3. Power off
4. Check interface board side of power connector RX1 scale.
  - A. Check voltage lines for short to pin 12.\*
  - B. Check for voltage lines shorted together. Connect one lead to a voltage line and probe the other voltage lines. Repeat for each voltage line.\*

\*SOME RESISTANCE READINGS MAY BE MEASURED BUT SHOULD NEVER BE A DIRECT SHORT (ZERO OHMS).

5. Short indicated
 

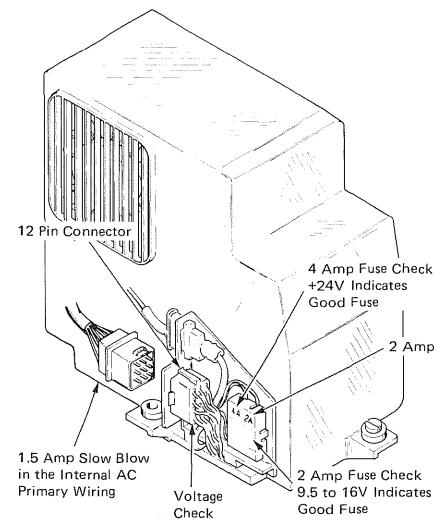
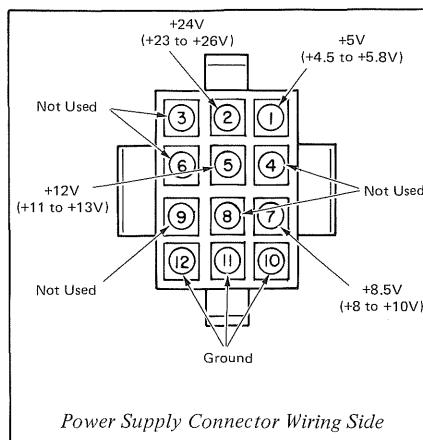
Check DC cables, connectors, printer or interface board.

6. No short indicated
  - A. Repeat last operation in progress before fuse blew.
  - B. Perform printer tests.
  - C. An intermittent short may be detected by tilting the printer, pulling the cables, etc.

### POWER SUPPLY CONNECTOR OUTPUT

1. Disconnect power supply DC connector.
2. Using pins 10, 11 and 12, check voltages for indicated range as shown in drawing.

NOTE: If voltages read low, turn power off, reconnect DC connector and wait 30 seconds. Repeat from step 1. (Power supply may turn itself off without damage if voltage read low.)



Note: If it fails, no voltage will be present at any output and the fan will run.

Note: Must be the same at both ends of the fuse.

*Power Supply*

| CE Diagnostics  |                  | MDIS Printer          |                | MEMORY XXXX |                   |
|---|------------------|-----------------------|----------------|-------------|-------------------|
| CEDXXX  |                  |                       |                | Kyb         | XXX               |
| PRINTER TESTS   |                  |                       |                |             |                   |
| FUNCTIONAL  |                  | DIAGNOSTIC/ADJUSTMENT |                |             |                   |
| ID  | ITEM             | ID                    | ITEM           | ID          | ITEM              |
| a   | S Print Exercise | i                     | Rotate         | t           | Backspace         |
| b   | F Customer Print | j                     | Tilt           | u           | Tab               |
| c   | Space/Backspace  | k                     | Ribbon Feed    | v           | Card Holder       |
| d   | Shift            | l                     | Index          | w           | Sel. Latch (all)  |
| e   | Tab              | m                     | Double Index   | x           | Sel. Latch (each) |
| f   | Word Underscore. | n                     | Triple Index   | y           | Dead Key          |
| g   | Overbank         | o                     | Reverse Index  | z           | Paper Bail        |
| h   | Reverse Index    | p                     | Shift          | aa          | Ribbon Sensor     |
|   |                  | q                     | Velocity       | bb          | Paper Sensor      |
|   |                  | r                     | Carrier Return | cc          | Echo Print        |
|   |                  | s                     | Space          |             |                   |
| <br>'message line 1 . . . '<br>'message line 2 . . . '<br>'message line 3 . . . ' |                  |                       |                |             |                   |
| Type ID letter to choose ITEM, press ENTER:<br>'system messsage line . . . '      |                  |                       |                |             |                   |

NOTE: This Printer Test Menu is for reference only and is subject to change with future software revisions.

| TEST NAME      | PRINTER ACTION   |
|----------------|--|
| Rotate*        | Print "T" "O" "M" "W" "t"                                      |
| Tilt*          | Print "z" "j"  |
| Ribbon*        | Print 40 underscores<br>Print 40 "H's"                         |
| Index          | Print one underscore<br>Forward index                          |
| Double Index   | Print one underscore<br>Forward index twice<br>Restore         |
| Triple Index   | Print one underscore<br>Forward index three lines<br>Restore   |
| Reverse Index  | Print one underscore<br>Reverse index one-half line            |
| Shift*         | Print lower case "z"<br>Print upper case "Z"                   |
| Velocity*      | Print "Z"<br>Print ":"<br>No print cycle                       |
| Carrier Return | Long escape 80 spaces (10 pitch)<br>Restore                    |
| Space          | Short escape 80 single spaces<br>Restore                       |
| Backspace      | Long escape 80 spaces (10 pitch)<br>Backspace 80 single spaces |

| TEST NAME                 | PRINTER ACTION  |
|---------------------------|---|
| Tab                       | Tab 4 times, 15 spaces each<br>Restore  |
| Dead Key                  | Print D (no escape)<br>Print underscore<br>Print comma<br>Print K (no escape)<br>Print underscore   |
| Cardholder                | Print twenty "V's, one "I", twenty "V's<br>Double index, carrier return<br>Print twenty "V's, one "I", twenty "V's<br>Center carrier on "I" |
| Selection Latches (All)   | Print a negative five tilt three character  |
| Selection Latches (Each)* | Print "w" (T1)<br>Print "b" (T2)<br>Print "Y" (R1)<br>Print "j" (R2)<br>Print "q" (R2A)<br>Print "/" (R5)                                   |
| Paper Bail                | Forward index seven lines<br>Activate paper bail solenoid   |
| Ribbon Sensor             | Center carrier<br>(Follow system prompts)   |
| Paper Sensor              | No printer action required<br>(Follow system prompts)   |
| Echo Print                | Keyboard entry  |

\*Press the STOP button to advance to  
the next operation within the test.

**Error Identification**

Printer electronic and mechanism errors are as follows:

**Print Feedback** — indicates the expected print feedback signal was not sensed within a timeout period. For example, when the cycle clutch magnet is activated, the print feedback switch is expected to close within a specified time. When the switch closes, the cycle clutch magnet is deactivated. The print feedback switch is also expected to open within a specified time. If the switch appears to be stuck open or closed, one of the timeouts is exceeded and a print feedback error is sent to the system.

**Shift Feedback** — indicates a shift operation was not detected by the feedback switch within the permitted response time or the shift mode is incorrect.

**Overbank Feedback** — indicates the overbank switch did not operate during the expected response time.

**Index Feedback** — indicates an index operation was not sensed within the permitted response time.

**NOTE:** The printer electronics only recognizes that a feedback error occurred. The individual error messages for the print, shift, index and overbank feedback are sent by the printer electronics after determining which operation was being performed when the error was sensed. This is necessary because the four feedback signals are combined on the interface board into one error signal.

Therefore, the individual feedback circuit indicated on the display should be considered as the most likely, but NOT the only, cause of the error.

**Forward Escape** — indicates the required number of emitter pulses were not sensed within a timeout period. This situation can occur while performing the following operations:

- Four emitter pulses are not sensed while waiting for the leadscrew speed to stabilize when homing.
- The time between emitter pulses exceeds a timeout while homing.
- An emitter pulse is not sensed following the home pulse when homing.
- The requested number of emitter pulses are not sensed when performing a forward escapement of more than six units.
- An overlapped forward escape was not completed while executing the following operation or before the idle state was entered.

**Reverse Escape** — indicates the required number of emitter pulses were not sensed within a timeout period. It also is used to indicate that the end of the last emitter pulse was not sensed.

**Overbank (Unexpected)** — indicates an overbank switch closure was sensed while backspacing. This condition occurs when a backspace is attempted at the left margin final stop.

Other detectable errors include parity, frame and overrun errors. When they are sensed during diagnostics, the USART which received the error will be identified along with the error type.

**Parity Error** — indicates the sum of the data bits received was incorrect.

**Frame Error** — the stop bit position of the data received was incorrect.

**Overrun** — indicates the data was received faster than it could be processed.

**Error Recovery (Restore Command)**

The restore command is normally used for printer error recovery. This command will cause the carrier to be returned to the left margin final stop, but does not cause an index operation. It is also used to reset printer status. The printer rejects all other print commands when an error occurs.

If the restore operation is not successful, another exception response byte will be sent by the printer to indicate another printer error, and the new error indication will be displayed.

The restore command also provides recovery from an unexpected overbank switch closure. The restore operation will cause a forward escapement until the overbank switch opens and then homes the leadscrew.

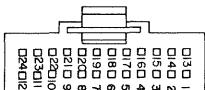
The position of the shift mechanism is compared with the expected position during a carrier return. If they are different, a shift operation is performed and a shift error is indicated. Although the position is now correct, a restore command is required to clear the printer status.

All voltages are positive DC  $\pm$  10%. All readings are taken with the printer in the normal mode, not ready state, end-of-ribbon sensor held down and machine in lower case.

#### CAUTION

Turn power off before disconnecting an interface board connector.

INTERFACE BOARD CONNECTOR



POSITION NO. 2 INTERFACE BOARD CONNECTOR

| Pin | Static | Active      | Name                  | Terminates |
|-----|--------|-------------|-----------------------|------------|
| 1   | +24    | $\emptyset$ | Escapement Magnet     | C-4        |
| 2   | +24    | +24         | +24 VDC               | E-1        |
| 3   | +12    | +12*        | +12 VDC               | PS-5       |
| 4   | +24    | $\emptyset$ | Cycle Clutch Magnet   | C-5        |
| 5   | +24    | $\emptyset$ | Dead Key Magnet       | C-7        |
| 6   |        |             |                       |            |
| 7   | +24    | $\emptyset$ | Backspace Magnet      | D-6        |
| 8   |        |             |                       |            |
| 9   |        |             |                       |            |
| 10  |        |             |                       |            |
| 11  |        |             |                       |            |
| 12  |        |             |                       |            |
| 13  | +5     | +5*         | +5 VDC                | PS-1       |
| 14  | +24    | +24*        | +24 VDC               | PS-2       |
| 15  |        |             |                       |            |
| 16  |        |             |                       |            |
| 17  |        |             |                       |            |
| 18  |        |             |                       |            |
| 19  | +24    | $\emptyset$ | Carrier Return Magnet | F-2        |
| 20  | +24    | $\emptyset$ | T2 Magnet             | A-7        |
| 21  |        |             |                       |            |
| 22  |        |             |                       |            |
| 23  |        |             |                       |            |
| 24  |        |             |                       |            |

Before replacing an interface board:

- Check the connectors for loose, broken, or bent pins.
- Reseat jumpers and connectors.
- Check Power Supply input voltages.

The Power Supply ground inputs must be checked in two ways:

- Check for less than 0.6 VDC between the ground pins on the board connectors and frame ground.
- Check each ground pin on the board and one of the input voltages already checked. If the readings are not the same ( $\pm$  0.6 VDC), a faulty ground circuit is indicated (loose connection, broken wire, etc.).

POSITION NO. 3 INTERFACE BOARD CONNECTOR

| Pin | Static      | Active        | Name                 | Terminates |
|-----|-------------|---------------|----------------------|------------|
| 1   |             |               |                      |            |
| 2   | +24         | $\emptyset$   | T1 Magnet            | A-6        |
| 3   | +24         | $\emptyset$   | Low Velocity Magnet  | F-4        |
| 4   | +24         | $\emptyset$   | Power Save Relay**   | A-8        |
| 5   |             |               |                      |            |
| 6   | +24         | $\emptyset$   | Reverse Index Magnet | F-6        |
| 7   | +6          | +6            | Power Light          | At Light   |
| 8   | $\emptyset$ | $\emptyset$   | Power Light Ground   | At Light   |
| 9   | +8.5        | +8.5*         | +8.5 VDC             | PS-7       |
| 10  | +24         | $\emptyset$   | Bail Magnet          | B-8        |
| 11  | +8.5        | +8.5*         | +8.5 VDC             | PS-7       |
| 12  | +24         | $\emptyset$   | Shift Magnet         | C-6        |
| 13  |             |               |                      |            |
| 14  | +24         | $\emptyset$   | No Print Magnet      | F-5        |
| 15  | $\emptyset$ | $\emptyset$ * | Magnet Ground        | PS-10      |
| 16  | +12         | $\emptyset$   | Ribbon Light         | At Light   |
| 17  | +12         | +6            | Ribbon Light         | At Light   |
| 18  | $\emptyset$ | +5            | Start                | At Switch  |
| 19  | $\emptyset$ | +5            | Cancel               | At Switch  |
| 20  | $\emptyset$ | $\emptyset$   | Switch Ground        | At Switch  |
| 21  |             |               |                      |            |
| 22  | +12         | $\emptyset$   | Ready Light          | At Light   |
| 23  | +12         | +6            | Ready Light          | At Light   |
| 24  |             |               |                      |            |

POSITION NO. 4 INTERFACE BOARD CONNECTOR

| Pin | Static      | Active        | Name                         | Terminates |
|-----|-------------|---------------|------------------------------|------------|
| 1   |             |               |                              |            |
| 2   |             |               |                              |            |
| 3   |             |               |                              |            |
| 4   |             |               |                              |            |
| 5   |             |               |                              |            |
| 6   | $\emptyset$ | $\emptyset$   | Ground                       | E-5        |
| 7   |             |               |                              |            |
| 8   | +24         | $\emptyset$   | R2A Magnet                   | A-5        |
| 9   |             |               |                              |            |
| 10  |             |               |                              |            |
| 11  | +24         | $\emptyset$   | R1 Magnet                    | B-7        |
| 12  | +5          | $\emptyset$   | Paper Out **                 | F-8        |
| 13  | +4          | $\emptyset$   | Overbank                     | At Switch  |
| 14  | +4          | $\emptyset$   | Shift Mode                   | At Switch  |
| 15  | 0           | +8.5          | Emitter                      | D-5        |
| 16  | +24         | $\emptyset$   | Forward Index Magnet         | F-1        |
| 17  | +24         | $\emptyset$   | R5 Magnet                    | B-5        |
| 18  | $\emptyset$ | $\emptyset$ * | Ground                       | PS-11      |
| 19  | $\emptyset$ | $\emptyset$ * | Ground                       | PS-12      |
| 20  | +5          | +5*           | +5 VDC                       | PS-1       |
| 21  |             |               |                              |            |
| 22  | +5          | $\emptyset$   | End of Ribbon                | F-3        |
| 23  | +24         | $\emptyset$   | R2 Magnet                    | B-6        |
| 24  | +4          | $\emptyset$   | Feedback (print/shift/index) | At Switch  |

\* Power Supply Input

\*\* If Feature Installed

## 48- Cycle Maintenance Procedure

The following information is to aid the Customer Engineer in generating an inspection procedure for a specific machine. Those areas shown below should not be the only areas which receive attention. Since each machine installation will differ slightly in application and environment, this procedure is to be used only as a guide.

### EVERY CYCLE

- A. Note operator's comments.
- B. Perform a complete series of functional tests.
- C. Lubricate typehead lever pivot points and inside surface with No. 23 grease or silicone lubricant.
- D. Clean cardholder with No. 10 oil.
- E. Clean the following points with IBM Cleaning Fluid.
  - 1. Platen
  - 2. Deflector
  - 3. Feed rolls
  - 4. Bail rolls

### CYCLE A

- A. Check the rotate and tilt homing adjustments.
- B. Check the carrier and alignment adjustments.
- C. Lubricate the following points in the printer.

#### No. 10 Oil (Bottom of Machine)

- 1. Rotate link pivots
- 2. Positive latch bail pivots (wicks)
- 3. Positive latch bail roller pivots
- 4. Negative latch bail pivot
- 5. Negative latch bail roller pivot
- 6. Shift arm pivot (wick)
- 7. Cycle shaft gear plate bearing

#### No. 23 Grease (Bottom of Machine)

- 1. Velocity yoke slider

### CYCLE B

No maintenance required.

### CYCLE C

- A. Check the impression and velocity adjustments.
- B. Lubricate the following points in the printer.

#### No. 10 Oil (Top of Machine)

- 1. Rotate and tilt pulleys
- 2. Idler gear bearings
- 3. Left cycle shaft bearing
- 4. Tilt arm pivot
- 5. Rotate arm pivot (wick)
- 6. Motor
- 7. Print shaft bearings
- 8. All selection latches and differential lever pivots
- 9. Rotate bellcrank
- 10. Top of rotate bellcrank (wick)
- 11. Center bearing
- 12. Index cam (wick)
- 13. Index cam follower pivot (wick)
- 14. Escapement cam follower pivot (wick)
- 15. Shift arm pulley
- 16. Shift cam backup roller
- 17. Shift arm roller
- 18. Print shaft wipers
- 19. Print cam follower pivot
- 20. Tilt ring pivot pins
- 21. Upper ball sockets
- 22. Tilt bellcrank and link
- 23. Rocker shaft
- 24. Motor belt idler roller
- 25. Escapement clutch (3 drops) (wick)
- 26. Leadscrew drive shafts
- 27. Escapement knockoff arms (wick)
- 28. Leadscrew center support

### CYCLE D

- A. Power clean the printer and wash covers.
- B. Lubricate the following points in the printer.

#### No. 23 Grease (Top of Machine)

- 1. Idler gear teeth
- 2. Cycle clutch restore cam
- 3. Cycle clutch (keep grease off magnet armature)
- 4. Front carrier support
- 5. Clutch ratchets
- 6. Paper release lever cam surface
- 7. Operational shaft bearing and shift clutch spring
- 8. Ribbon lift cam
- 9. Detent cam
- 10. Rear rail
- 11. Leadscrew
- 12. Print cams
- 13. Ribbon feed cam
- 14. Ribbon cam windows and surface
- 15. Paper bail bellcrank pivot
- 16. Paper bail link eccentric and bail link pivot
- 17. Bail closer solenoid pin

#### No. 10 Oil

- 1. Ribbon lift guide slots (1 drop)
- 2. Ribbon lift arm pivots
- 3. Ribbon lift cam follower roller and pivot
- 4. Ribbon feed roller
- 5. Ribbon spike driver pivot



International Business Machines Corporation  
Office Products Division  
Customer Engineering

IBM "Selectric" Element Printer  
Displaywriter System S241-6249-0

S241-6249-0

Printed In USA November, 1980